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The Agricultural Economist.

THE Malayan Agricultural Journal.

JANUARY, 1935.

EDITORIAL.

Agricultural Exports of the Netherlands Indies. The importance of the Netherlands Indies as an exporter of agricultural products is again emphasised by the figures given in the annual publication of the Department of Economic Affairs of that country, entitled *The Export Crops of the Netherlands Indies in 1933*, an abstract of which we publish in this number. Abstracts of previous publications in respect of the years from 1929 onwards have been published in the pages of this Journal. In order not to recapitulate information already published, the reader is advised to compare the present abstract with that published in the *Malayan Agricultural Journal* of February 1934, which deals with the year 1932 and includes many tables giving comparisons with previous years.

One is struck by the fact that although the Netherlands Indies maintains a very large population, the exports include a number of staple food crops produced in excess of local demand. The only important exception is rice, of which the imports into the Netherlands Indies are still very considerable. It is evident, however, that even in this case, the policy is to render the country self-supporting, and it is conceivable that in a few years the position may be reversed and the Netherlands Indies become an exporter of this product. The area under this crop has steadily increased in recent years—from 3,423,000 hectares in 1929 to 3,778,000 hectares in 1933, while the imports from foreign countries have steadily decreased—from 402,397 metric tons in 1929 to 260,431 metric tons in 1933.

The agricultural exports of the Netherlands Indies are of great importance to Malaya. According to Malayan statistics of imports, the value of animals, food and tobacco imported into Malaya from the Netherlands Indies in 1933 was \$19,000,000 to which must be added Para rubber, exceeding \$15,000,000 and other agricultural products valued at over \$8,000,000.

Many of these products, including, of course, all the Para rubber, are re-exported, and the trade, chiefly centred in Singapore, which is concerned in many cases in grading and re-conditioning these products prior to re-export, is a most valuable one. When, however, due allowance is made for this trade,

Original Articles.

RICE IN MALAYA IN 1934

BY

D. H. GRIST,

Agricultural Economist.

Favourable crops in rice-producing countries and the reduced purchasing power of Asiatics have been instrumental in reducing the average price of rice to a level which has no parallel in recent years. In the middle of the year prices touched an extremely low level, but later shewed a marked recovery.

Table I.

Average Price of Rice and Padi in Malaya 1934.

Month	Wholesale Prices of Rice Dollars per picul (133 lbs.)			Retail Prices of Rice Cents per gantang (gallon)			Price of Padi per picul at Government Rice Mill, Bagan Serai
	Siam No. 2 (ordinary)	Rangoon No. 1	Sigon No. 1 (long grain)	Singapore	Penang	Malacca	
January ...	2.91	2.72	2.65	23	28	24	1.50
February ...	3.06	2.50	2.60	22	26	24	1.40
March ...	2.82	2.47	2.62	23	26	24	1.40
April ...	2.54	2.42	2.57	23	25	24	1.40
May ...	2.60	2.42	2.50	23	25	23	1.40
June ...	2.66	2.50	2.60	21	25	23	1.25
July ...	2.78	2.77	2.82	22	24	23	1.25
August ...	3.13	3.16	3.17	23	24	23	1.50
September ...	3.39	3.30	3.30	26	25	26	1.50
October ...	3.14	3.15	3.05	26	25	24	1.50
November ...	2.96	2.85	2.92	24	25	24	1.50
December ...	2.95	2.86	2.95	22	20	22	1.50
Average for 1934	2.91	2.76	2.81	23	25	24	1.42
Average prices in 1933 ...	3.53	3.04	3.22	25	27	27	1.65

Imports and Exports.

The total imports of rice for the first eleven months of 1934 amounted to 562,301 tons being 18,569 tons more than for the corresponding period of 1933. Exports January to November 1934, inclusive, were 148,957 tons, an increase of 592 tons. Net imports for the first eleven months of 1934 were 413,344 tons, valued at \$21,956,311, as compared with 395,367 tons, valued at \$22,233,430 in the corresponding period of 1933. With improved trade conditions an increase in consumption was to be expected. The relatively low price of rice has also probably led to greater consumption. It is probable that the cost to Malaya of net imports of rice in 1934 will amount to \$23,500,000 as compared with an actual cost in 1933 of \$24,404,242.

Table II.
Rice: Malayan Imports and Exports.

Year	Imports		Exports		Net Imports	
	Tons	Value \$	Tons	Value \$	Tons	Value \$
1929	785,558	95,461,036	233,897	28,031,407	551,661	67,429,629
1930	800,443	87,666,723	208,688	23,361,561	591,755	64,305,162
1931	691,112	48,458,102	175,385	13,453,189	515,727	35,004,913
1932	592,145	39,729,242	182,515	12,605,402	409,630	27,123,840
1933	592,912	33,846,158	159,746	9,493,291	433,166	24,352,867
1934	610,000*	32,100,000*	165,000*	8,600,000*	445,000*	23,500,000*

* Estimated.

Malayan Production of Rice.

Heavy padi crops have been harvested throughout Malaya, with the exception of Kelantan in which State extensive damage was occasioned by floods. The following table gives acreage under padi and the crop in terms of rice. Comparison of these figures with a similar table published in this Journal in December 1933 shews small differences throughout of the yield of rice. This is accounted for by the fact that whereas the conversion figure was previously taken as 686 gantangs of padi equal 1 ton rice, it is now considered that under local conditions a more accurate and convenient figure is 700 gantangs to 1 ton of rice.

Table III.
Area of Rice Land Planted in Malaya and Yield of Rice.

Season	F.M.S.		S.S.		U.M.S.		Total	
	Area acres	Production rice tons	Area acres	Production rice tons	Area acres	Production rice tons	Area acres	Production rice tons
1929—30	174,466	47,753	67,005	25,142	415,727	75,937	657,198	148,832
1930—31	178,930	55,264	67,350	38,053	461,460	161,561	707,740	254,878
1931—32	194,580	64,371	67,980	37,701	462,420	179,503	724,980	281,575
1932—33	214,160	72,625	70,530	34,300	482,220	178,448	766,910	285,373
1933—34	195,690	75,006	70,550	42,034	499,010	203,656	765,250	320,696*

(Yield estimated on a basis of 700 gantangs padi = 1 ton rice).

The total yield is thus a record and exceeds the record figure for the previous season by 12 per cent.

Planted Area.

The total area planted with padi in the season 1933-34 was slightly less than the previous year, but whereas in 1932-33 there were 674,920 acres under "wet" cultivation system and 91,990 acres under the "dry" system, in the season 1933-34 the "wet" cultivation had increased by 16,190 acres, and the "dry" cultivation had decreased by 17,850 acres. This change over from the dry to the wet system is an important factor and partly accounts for the increased production.

Yields of Padi.

Favourable weather, the more extended use of improved seed, better water control and more systematic hunting of rats are all factors which have resulted in the improved results.

The following table gives details of the area and yield of padi in recent years.

Whereas the area planted shewed no increase over that of the previous season, the yield was 24,726,000 gantangs more, giving an all-over yield per acre at the rate of 293 gantangs as compared with 260 gantangs in the previous season.*

*Owing to local difficulties, the statistics of areas under padi and especially of yields should be treated as approximations. Improvements in the methods of collecting such data have been effected in recent years, but such improvements render comparison with previous years liable to misleading conclusions.

Table IV.
Areas and Yields of Padi in Malaya.

Area	Acres	Gantangs	Yield per Acre
1922	644,200	140,727,000	218
1923	657,380	156,411,000	238
1924	651,930	149,152,000	229
1925	656,080	159,135,000	243
1926	653,900	120,001,000	184
1927	649,690	128,374,000	198
1928	663,070	135,127,000	204
1929	687,060	126,229,000	184
1930	657,200	106,784,000	162
1931	707,740	175,867,000	248
1932	724,980	197,103,000	272
1933	766,910	199,761,000	260
1934	765,250	224,487,000	293

In the Federated Malay States the area under wet padi decreased by 5,860 acres and under dry padi by 12,610 acres. The yield, however, increased by 4,165,000 gantangs of wet padi and decreased by 2,498,000 gantangs of dry padi, giving a net increase in 1933-34 of 1,667,000 gantangs. The yield per acre of wet padi was 282 gantangs as compared with 251 gantangs in the previous season and 245 gantangs in the 1931-32 season.

The area under padi in the Straits Settlements in the season 1933-34 was about the same as in the previous season. The yields, however, were extremely good, especially in the large area of Province Wellesley, where the production of wet padi increased by 3,549,000 gantangs, an average of 435 gantangs per acre, compared with 324 gantangs in the previous season. In Malacca, the average yield per acre was 383 gantangs as compared with 348 gantangs in 1933. The Penang area, although only a little over 4,000 acres, gave a record yield of 600 gantangs per acre.

In the Unfederated Malay States, Kedah, which contains one-third of the total area under "wet padi in Malaya, gave a crop of "wet" padi of 392 gantangs per acre, as against 340 gantangs per acre in 1933. The area under "wet" padi also increased by 19,450 acres.

Table V.
Area of Land Planted with Padi and Yields, Malaya, Season 1933-34.

State or Territory	Wet		Dry		Total	
	Acres	Gantangs	Acres	Gantangs	Acres	Gantangs
Perak ...	90,570	28,142,000	8,660	741,000	99,230	28,883,000
Selangor ...	18,750	3,965,000	2,660	220,000	21,410	4,185,000
N. Sembilan ...	34,360	11,586,000	670	69,000	35,030	11,655,000
Pahang ...	37,710	7,562,000	2,310	219,000	40,020	7,781,000
Total F.M.S. ...	181,390	51,255,000	14,300	1,249,000	195,690	52,504,000
P. Wellesley ...	32,670	14,216,000	800	227,000	33,470	14,443,000
Dindings ...	460	65,000	120	15,000	580	80,000
Malacca ...	32,260	12,357,000	nil	nil	32,260	12,357,000
Penang ...	4,240	2,544,000	nil	nil	4,240	2,544,000
Total S.S. ...	69,630	29,182,000	920	242,000	70,550	29,424,000
Johore ...	17,040	1,838,000	6,780	602,000	23,820	2,440,000
Kedah ...	238,460	93,117,000	5,320	903,000	243,780	94,020,000
Perlis ...	41,590	17,268,000	nil	nil	41,590	17,268,000
Kelantan ...	112,550	18,414,000	35,950	4,983,000	148,500	23,397,000
Trengganu ...	30,450	4,024,000	10,870	1,410,000	41,320	5,434,000
Total U.M.S. ...	440,090	134,661,000	58,920	7,898,000	499,010	142,559,000
Total Malaya ...	691,110	215,098,000	74,140	9,389,000	765,250	224,487,000

The next largest area in Malaya—Kelantan—experienced unfavourable weather conditions which resulted in widespread destruction of the crop. Consequently, the yield per acre of “wet” padi was only 163 gantangs, as compared with 222 gantangs per acre in 1933.

Yields in Perlis were good at 392 gantangs of “wet” padi per acre as compared with 260 gantangs in 1933.

The yield of “wet” padi per acre for the season in the Unfederated Malay States was 306 gantangs and of “dry” padi 134 gantangs as compared with 276 and 147 gantangs respectively in the season 1932-33.

The yields per acre for Malaya in the season 1933-34 were “wet” padi 311 gantangs and dry padi 127 gantangs, as compared with 276 gantangs and 146 gantangs respectively in 1932-33 season.

Consumption compared with Production.

The following table gives a comparison of imports, production and consumption, from which it is seen that in spite of an increase in consumption during the past three years of nearly 40,000 tons, local production has been maintained at 40 per cent. of consumption. With the improvement in trade conditions, it cannot be expected that this ratio can be maintained. Consumption is bound to increase still further, and there may be difficulty in some districts in maintaining the planted area in view of the attraction which rubber tapping has for the Malay small-holder.

Table VI.
Malayan Production of Rice in Relation to Net Imports and
Consumption, 1929-1934.

	1929	1930	1931	1932	1933	1934
Net imports ...	551,661	591,755	516,832	409,000	433,166	485,000
Production (tons) ...	180,328	148,832	254,878	281,575	285,373	320,696
Consumption (tons) ...	731,989	740,587	771,700	690,575	718,539	805,696
Percentage of production to net imports ...	33	25	49	69	66	66
Percentage of production to consumption ...	25	21	33	40	40	40

Acknowledgment.

The estimates of acreage and yields of padi in Malaya in 1934 were made by officers of the Field Branch of the Department of Agriculture in collaboration with the Land Officers.

RICE EXPERIMENTS IN MALAYA 1933-1934

Selection, Varietal and Minor Cultural Trials

Compiled by
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Introduction.

The information contained in this article is the outcome of close collaboration between the Field and Research Branches of the Department of Agriculture, and is compiled from the reports and records of Field Officers in charge of the various experimental centres throughout Malaya.

During the season under review, experimental work on rice has been undertaken on five Rice Experiment Stations, and twenty-three Test Plots throughout Malaya, the distribution of which is given in Table I.

Table I.
Distribution of Rice Experiment Stations and Test Plots.

Name of Station or Test Plot	State	Locality
Titi Serong Experiment Station	Perak	District of Krian
Talang Experiment Station	"	" " Kuala Kangsar
Kuala Kurau Test Plot	"	" " Krian
Selinsing Test Plot	"	" " "
Briah Test Plot	"	" " "
Bukit Gantang Test Plot	"	" " Larut
Lenggong Test Plot	"	" " Upper Perak
Bruas Test Plot	"	Sub-district of Bruas
Telok Chengai Experiment Station	Kedah	
Langgar Test Plot	"	Kota Star North
Jitra Test Plot	"	Kubang Pasu
Sala Kanan Test Plot	"	Kota Star South
Rantau Panjang Test Plot	"	Kuala Muda
Pulai Test Plot	"	Baling
Dong Test Plot	Pahang	District of Raub
Temerloh Test Plot	"	" " Temerloh
Pekan Test Plot	"	" " Pekan
Sungei Blat Test Plot	"	" " Kuantan
Central Experiment Station	Kelantan	Kota Bahru
Pasir Puteh Test Plot	"	
Kajang Test Plot	Selangor	District of Ulu Langat
Kuang Test Plot	"	" " Ulu Selangor
Kendong Test Plot	Negri Sembilan	" " Tampin
Jehebu Test Plot	"	" " Jehebu
Bukit Merah Test Plot	Province Wellesley	" " Central
Glugor Test Plot	Penang	" " South West
Sungei Tontong Test Plot	Dindings	
Pulau Gadong Experiment Station	Malacca	District of Central

The selection and varietal work with which this article deals principally is essentially associated with the progressive economic improvement of rice returns per unit of area, by the critical selection of types having desirable characteristics, and by the competitive trials of similar selections to determine ultimate superiority. The critical work in this connexion is undertaken at the Rice Experiment Stations. Proved selections from Experiment Stations are further tested for yield capacity against existing strains in the Test Plots, which are widely distributed throughout the rice-producing areas of the country to determine the environmental compatability of the fresh introductions. Apart from testing the suitability under local conditions of selected strains, the Test Plots serve the useful purpose of demonstrating to cultivators the performances of a large number of padi types of proved utility, and rendering seed supplies of these available for distribution.

The season 1933-34 was very favourable for the growth and development of the rice crop and highly satisfactory yields were obtained from the majority of producing centres.

A feature of the season in so far as experimental work is concerned has been the extensive change-over to a standard experimental lay-out in the so-called Latin Square arrangement, the advantages of which, from a point of view of analysis, is fully dealt with in the *Malayan Agricultural Journal*, Vol. XII, June, 1934.

The reports of investigations undertaken in the Unfederated Malay States are included by the courtesy of the various Governments concerned.

Perak.

During the season 1933-34, padi experiments in Perak were conducted at two Experiment Stations and six Test Plots.

Comparative yield trials of pure strains were conducted on Stations and Test Plots throughout the State. In all cases the lay-out was a four or five-way Latin Square, each plot being 1/120th acre in area, arranged in accordance with a standard formula.

Pure Line Selection.

Titi Serong Experiment Station.

Thirty-one pure strains were under cultivation, each strain being accommodated in three rows, 18 ins. apart with the plants 12 ins. apart in the rows. Ten of the strains were of the Seraup type, nine were Radins, and the remainder, with the exception of one Pahit strain, short-term strains having maturation periods of 5½ months and less.

Selection work was continued on two varieties, namely, Mayang Ebos and Bujang. Three years ear-to-row plantings of the former variety indicate that Mayang Ebos 203 is the most superior of the selections of that variety, although this is not entirely confirmed by Latin Square trials carried out during

the season at Titi Serong and elsewhere in Perak. Of the Krian variety, Bujang, six lines were planted during the season under review. Differences as between the strains over a period of three years are but slight, although 213 appears to exhibit superiority.

Foundation stocks—These comprise a number of single plant selections originating in the various States of the Federation, and in Kedah, Perlis and Kelantan making a total of fifty-three lines. The long term strains F.S. 48 and 55 (selections of Mayang Kuning from Kuala Kangsar and Province Wellesley respectively) F.S. 39 (a selection of Seraup Besar from Province Wellesley) and F.S. 42 (a Machang selection of unknown origin) have given good results over a period of three years, as also has the five months type F.S. 1 (a Serendah selection from Kajang).

For the current season, pure strains will be reduced to sixteen lines only, and will comprise stocks having a maturation period of not less than six months: shorter term varieties of padi will be transferred to Talang Station where conditions are more suited to their growth.

Selection work will be continued during the current season and will include in addition to the lines already retained, further critical observations on lines which have undergone preliminary selection in Perak Test Plots, and preliminary selections of lines obtained in the field.

At Bukit Gantang Test Plot preliminary selection on standard lines was made of three high-yielding strains obtained from Batu Kurau. A variety known as Padi Chantek, which has been collected at Selama, will undergo preliminary selection during the current season.

Varietal Trials.

The term varietal trial is used to indicate comparative yield trials between pure strains. A standard, in the shape of a local unselected variety, or a pure strain, is utilised where such is considered desirable.

Details of results will be found in Table II.

Titi Serong Experiment Station.

The season throughout was very favourable for the successful cultivation of padi. Water supplies were adequate and little damage was sustained as a result of pest attacks. The yields recorded were the best for some years. The second transplantings of a number of the short term strains were caught by floods and considerable damage resulted. As this has occurred on many previous occasions it has been decided to transfer to Talang Station all strains which have a maturation period of less than six months.

Varietal trials comprised three four-way and seven five-way Latin Squares.

Ten Seraup strains were tested in three four-way Latin Squares H, J & K, with Seraup Kechil 36 as the standard. In square H, Seraup Kechil 6 was significantly superior to Seraup Kechil 36 but not to Seraup Kechil 1 and 68,

In square J, Seraup Kechil 48 was significantly superior to Seraup Kechil 36 and 52 and Seraup Besar 15. In square K, Seraup Kechil 146 was significantly superior to Seraup Kechil 20 but not to Seraup Kechil 36 and 371. For the coming season, Seraup Kechil 1 and 20 have been dropped from the trials and Seraup Kechil 48 has been selected as the standard.

Nine Radin strains were under test in two five-way Latin Squares A & B with Radin 4 as the standard. In square A, Radin 16 was significantly better than Radin 2 but not to Radin 4, 7 and 13. In square B, Radin 11 was significantly superior to Radin 4 and 35 but not to Radin 1 and 12. For the coming season Radin 12 and 35 have been dropped from the trials.

Five Mayang Ebos strains were tested in a five-way Latin Square D, the results indicating that Mayang Ebos 203 was significantly superior to Mayang Ebos 207 but not to Mayang Ebos 202, 208 and 209. For the coming season Mayang Ebos 210 will replace Mayang Ebos 207 in the trials, as the former unexpectedly did well at the Lenggong Test Plot last season.

Three Serendahs and two Nachins were tested against each other in a five-way Latin Square C. Serendah 248 was significantly superior to Serendah 875 and N.27 but not to Serendah 11 and Nachin (Jambai) 756.

Three short-term Serendah selections from Kajang were tested against each other and against two Milek Puteh strains in a five-way Latin Square E. F.S. 1 proved significantly better than F.S. 5 and 9 and also to Milek Puteh 149.

Two five-way Latin Squares F & G were made up of promising medium and long-term Foundation Stocks respectively. In square F, F.S. 34 was significantly superior to F.S. 64, 67 and 28 but not to F.S. 36. In square G, F.S. 48 was significantly superior to F.S. 14 but not to F.S. 55, 71 and 39.

The programme for the current season, 1934-35, in respect of Seraup, Radin and Mayang Ebos strains has already been mentioned. Additional trials to be made are as follows:-

- (i) A five-way Latin Square comprising the five best Kelantan strains.
- (ii) A five-way Latin Square with the five best Bujang strains.
- (iii) A five-way Latin Square with the four most promising long term Foundation Stocks tested against a standard Seraup.

Kuala Kurau Test Plot.

An excellent growing season was experienced, but a series of storms during mid-January caused extensive lodging to the maturing padi, the Siam and Nachin types being particularly affected.

Varietal trials at this Test Plot consisted of two five and one four-way Latin Squares.

Square A comprised three Seraups and two late maturing Radins. Seraup 48 narrowly fell short of significance over Seraup Besar 15, but was definitely

superior to Radin 4 and 13. Seraup Kechil 36 was significantly superior to the Radins, but not to the Seraup Besar 15.

Square B was made up of pure strains having maturation periods of from 5½ to 6 months in duration. Radin 2 was significantly superior to Siam 29, Nachin 66 and Mayang Ebos 203, but not to Siam 76. The latter was significantly superior to N. 66 and M.E. 203 but just missed significance over Siam 29.

Square C was made up of four short-term Radin Siak strains from Pulau Gadong Experiment Station, Malacca. Radin Siak 18 was significantly better than Radin Siak 24, but not to Radin Siak 17 and 7.

For the coming season, the Seraups only are to be retained. The results of the past two seasons have conclusively demonstrated that of the pure strains tested, the Seraups show an overwhelming superiority as regards yields and general adaptability to local conditions. Seraup Kechil 36 and 48 will be tested against two of the best local varieties, the latter to be chosen by the Kuala Kurau Mukim Advisory Committee. Two other Seraups which have done well at Titi Serong Experiment Station of late years, namely Seraup Kechil 146 and 371, will be tested at Kuala Kurau during the current season.

Selinsing Padi Test Plot.

This Plot experienced satisfactory growing conditions throughout the season. Water supply was adequate and major pests of the crop were not greatly in evidence. Some damage to nurseries was occasioned by attacks of the caseworm *Nymphula depunctalis*. Yields were comparable to those recorded for the season 1932-33.

The varietal trials at this Station comprised one four-way and one five-way Latin Square.

Square A was a composite one comprising one early maturing Radin, one Serendah, one Radin Siak and one Nachin strain. Serendah 824 proved significantly superior to Radin Siak 17 but not to Radin 2 and Nachin 8.

Square B was made up of three Nachin and two Siam types. Nachin 10 and Siam 29 were significantly better than Siam 76 and Nachin 27, but just missed significance over Nachin 66.

For the current season Nachin 10, Siam 29, Mayang Ebos 203, Siam 76 and Nachin 66 will undergo further comparative tests. In view of the growing popularity of Seraups and other long-term strains in the deeper areas of the mukims of Selinsing and Gunong Semanggol, together with the anticipation of more adequate water supplies to these areas, Seraup strains will be introduced for the purpose of critical observations.

Briah Test Plot.

The main feature of the season at this Plot was the severe flooding of the nurseries, the majority of the varieties being inundated on at least three

occasions for periods of from 24 and 48 hours. The varietal trial area remained relatively free from pest damage. Yields were below those recorded for the 1932-33 season.

The varietal trials comprised two four-way Latin Squares, in which a slight deviation from the standard lay-out was necessitated.

Square A was made up of two Siams, a Nachin and an early-maturing Radin strain. Siam 29 was significantly superior to Siam 76 and Radin 2, but just fell short of significance over Nachin 66.

Square B comprised two Serendahs, a Radin Siak and a Mayang Ebos. Mayang Ebos 203 was significantly superior to Serendah 824 and overwhelmingly so to Radin Siak 17 and Serendah 875.

The strains Mayang Ebos 203 and Siam 29 have shown themselves to be definitely superior in two consecutive seasons to the other strains. They will be finally tested during the coming season against the strains Siam 76 and Nachin 66, which were insufficiently acclimatised last season, and against the best local variety, the latter to be chosen by the Mukim Advisory Committee.

Bukit Gantang Test Plot.

Conditions at this Plot were satisfactory for sowing and planting, but shortage of water occurred soon after planting and this condition continued throughout September, which was an exceptionally dry month, and into early October. Later in that month continuous rain caused the plants to make renewed growth. February was a very wet month and harvesting was carried out under unsatisfactory conditions. As a result, the crop ripened irregularly and efficient drying of the reaped padi was difficult.

The varietal trials consisted of four four-way Latin Squares. Square A comprised two Siam, one Nachin and one Mayang Ebos strain. Siam 76 was significantly superior to Siam 29 and Nachin 66, but not to Mayang Ebos 203. Siam 29 lodged badly, Siam 76 and Nachin 66 to a less extent, while Mayang Ebos exhibited little tendency to this weakness.

Square B was made up of short-term Radin Siak strains from Pulau Gadong Experiment Station, Malacca. Radin Siak 18 was significantly superior to Radin Siak 24, but not to Radin Siak 7 and 17. Of these four strains Radin Siak 18 showed the least tendency to lodge.

Square C consisted of four Radin strains. Radin 7 just attained significant superiority over Radin 4 and was very definitely superior to Radin 2 and 13. This is the second consecutive season in which Radin 7 has exhibited comparatively high yields, though last season it shared this distinction with Radin 2 which is now at the bottom of the list in the trials described.

Square D comprised four long season Seraup strains, Seraup Kechil 36, Seraup Kechil 48, Seraup Kechil 68 and Seraup Besar 15. Differences in yields were obviously too slight to warrant statistical analysis.

Talang Experiment Station.

As at Bukit Gantang, the crop at this Station suffered a set-back caused by exceptionally dry weather in September. Late rains caused irregular ripening of the crop, but harvesting was completed under better conditions than obtained at Bukit Gantang.

Varietal trials consisted of one five-way and two four-way Latin Squares.

Square A comprised two Siam and two Nachin strains. Siam 29 was significantly better than Nachin 10 and Nachin 66, but not superior to Siam 76.

Square B consisted of two Radin strains, one Mayang Ebos, one Nachin and one Serendah. Mayang Ebos 203 proved significantly superior to R.2, R.4 and Serendah 824, but just failed to show significance over Nachin 756.

Square C was a repetition of the four standard Pulau Gadong Radin Siak strains. Here Radin Siak 17 and Radin Siak 24 were obviously significantly better than Radin Siak 7 and Radin Siak 18 and no statistical analysis was undertaken.

Bruas Test Plot.

Weather conditions were fairly good and water supplies adequate throughout the season. Yields continued to show the irregularity noted last season owing to soil variations caused by recent levelling and stump removals.

The varietal trials consisted of three four-way Latin Squares.

Square A contained four Seraup strains, Seraup Kechil 1, Seraup Besar 15, Seraup Kechil 36 and Seraup Kechil 48; square B, Radin 2, 4, 13 and Serendah 824, and square C Siam 29, Siam 76, Nachin 66 and Mayang Ebos 203. Only the results from square A were statistically analysed and showed an abnormally large standard deviation. Square B was considered unreliable through interference from an affection not yet fully determined but locally known as *penyakit merah*. The results from square C obviously exhibited no significant differences.

Lenggong Test Plot.

Conditions generally on this Plot were distinctly unfavourable for satisfactory growth and development. Heavy flooding was experienced during October and again a month later. Difficulties in connexion with contract work resulted in weeding receiving inadequate attention and harvesting being delayed. There was consequently much loss of grain from shattering, and lodging of the crop was general. Yields were much lower than usual for this Plot, which generally produces exceptionally heavy crops.

Three four-way Latin Squares were laid down comprising the following series: (a) Seraup; (b) Siam, Nachin, Radin; (c) Mayang Ebos. For the reasons previously explained, results were not statistically analysed, but the Mayang Ebos strains produced the heaviest yield.

Table II. (continued).

Station.	Square	Strains					Square	Strains				
		S.K. 36.	S.K. 48.	S.K. 52.	S.B. 15.	Radin 4.		S.K. 36.	S.K. 48.	S.K. 52.	S.B. 15.	Radin 4.
Titi Serong.	M.P.	235	238	238	241		K.	238	241	241	241	
	M.Y.	28.8	31.6	28.5	27.			26.2	27.7	30.1	25.1	
G.M. = 29.		S.D. = 1.4., M.S.D. = 2.3.					G.M. = 27.3,		S.D. = 2.3., M.S.D. = 4.			
Kuala Kurau.	M.P.	234	204	234	234	219	B.	175	175	175	184	175
	M.Y.	21.8	17.9	25.2	24.8	20.5		20.2	15.4	16.3	16.3	16.9
G.M. = 22.		S.D. = 2.3., M.S.D. = 3.5.					G.M. = 18.1,		S.D. = 2.32., M.S.D. = 2.4.			
		R.S. 17.	R.S. 24.	R.S. 18.	R.S. 17.							
	M.P.	171	171	171	171		C.	171	171	171		
	M.Y.	18.1	11.9	19.5	16.1							
G.M. = 16.1.		S.D. = 2.57., M.S.D. = 4.2.										
Selinsing		Radin 2.	Sr. 824.	R.S. 17.	Nachin 8.			Nachin 66.	Nachin 27.	Nachin 10.	Siam 76.	Siam 29.
	M.P.	215	201	186	197		B.	204	197	202	195	195
	M.Y.	13.6	14.7	12.	13.5			13.5	9.1	16.2	12.4	16.1
G.M. = 13.4.		S.D. = 1.02., M.S.D. = 1.74.					G.M. = 13.6,		S.D. = 2.03., M.S.D. = 2.9.			

Table II. (continued).

Station		Square	Strain					Square	Strain			
			Siam 29	Siam 76	Nachin 66	Radin 2			M.E. 203	Sr. 894	Sr. 875	R.S. 17
Brah	M.P.	A.	177	177	190	190		B.	179	183	178	165
	M.Y.		15.8	13.4	14.4	10.8			15.5	12.1	10.3	11.4
G.M. = 13.6, S.D. = 1.1, M.S.D. = 1.7.								G.M. = 12.3, S.D. = 1.5, M.S.D. = 2.4.	R.S. 7	R.S. 17	R.S. 18	R.S. 24
Bakit Gantang	M.P.	A.	194	194	193	193		B.	183	183	183	183
	M.Y.		21.6	19.5	24.5	23.7			18.7	15.9	21.2	18.8
G.M. = 22.3, S.D. = 1.5, M.S.D. = 2.4.								G.M. = 18.6, S.D. = 1.6, M.S.D. = 2.7.	R.S. 15	S.K. 36	S.K. 48	S.K. 58
			Radin 2	Radin 4	Radin 7	Radin 13						
	M.P.	C.	194	194	193	193		D.	208	209	209	209
G.M. = 26.5, S.D. = 1.3, M.S.D. = 2.3.	M.Y.		24.1	27.9	28.8	23.5			28.4	29.5	28.5	28.1
								G.M. = 28.6, Not Analysed. (1)				

Table II. (continued).

Station	Square	Strain				Square	Strain				
		Siam 29.	Siam 76.	Nachin 66.	Nachin 10.		M.E. 203.	Sr. 824.	Nachin 756.	Radin 4.	Radin 2.
Talang	M.P.	184	184	180	179	B.	176	173	169	193	190
	M.Y.	23.2	21.3	20.3	20.4		22.	18.9	19.7	17.3	19.1
G.M. = 21.4.,		M.S.D. = 2.3.				G.M. = 19.5,	S.D. = 1.58, M.S.D. = 2.5.				
		R.S. 17.	R.S. 24.	R.S. 18.	R.S. 7.						
	C.	177	177	175	174						
	M.Y.	17.	18.4	10.4	10.7						
Not Analysed (2)											
		S.K. 1.	S.K. 48.	S.B. 15.	S.K. 36.		Radin 4.	Radin 13.	Sr. 824.	Radin 2.	
Bras	A.	209	209	209	209	B.	196	196	192	192	
	M.Y.	16.	16.2	14.4	14.6		6.8	13.7	8.4	6.2	
G.M. = 15.3,		M.S.D. = 4.8.				Not Analysed (3)					
		S.D. = 2.82,									

Table II. (continued).

Station	Square	Strains				Square	Strains					
		Nachin 66	Siam 76	M.E. 203	Siam 29		R 2.	Nachin 66	Siam 29	Siam 76		
Bruas	M.P.	185	185	185	185							
	M.Y.	13.9	13.3	12.9	13.7							
	G.M. = 13.5.	Not analysed (4)										
Lenggong	M.P.	197	196	198	198	B.	174	173	174	173		
	M.Y.	22	22	25.5	19.4		28	20.2	18.3	17		
	Not analysed	(5)					Not analysed	(6)				
		M.E. 202	M.E. 210	M.E. 208	M.E. 203							
	M.P.	177	177	177	177							
	M.Y.	28.4	32.8	28.6	27.5							
	G.M. = 29.3.	S.D. = 2.96. M.S.D. = .38										

- (1). Differences not significant.
 (2). R.S. 17, and R.S. 24 obviously better than R.S. 18 and R.S. 7.
 (3). Yields vitiated by pest attack.
 (4). No significant difference.
 (5) and (6). Yields vitiated by crop losses due to lodging.
 Sr. = Serendah, M.E. = Mayang Ebos.
 F.S. = Foundation Stock, M.P. = Milek Puteh.
 S.K. = Seraup Kechil, S.B. = Seraup Besar.
 R.S. = Radin Siak.

Cultural Experiments.

For the third consecutive season an experiment has been conducted at Talang Experiment Station designed to ascertain the comparative effect of the following three systems of cultivation :—

- (a) Vegetative growth cut down with a *tajak* (an instrument consisting of a heavy cutting blade attached to a handle which cuts vegetation at or just below ground level and used when the land is flooded) and then rotted down.
- (b) Land cultivated with a mattock or digging hoe locally termed *changkol*.
- (c) Land ploughed with the local implement and then puddled with the local hexagonal roller.

Yields to date indicate no advantage for any one system. Circumstances made an ideal lay-out impracticable and it is hoped that it will be possible to conduct a better laid out experiment at Sungei Manik Experiment Station when opened.

Conditions, mainly in relation to drainage, which are peculiar to Krian, have caused the adoption in that District of methods of cultivation which would be considered unorthodox in other centres of rice production. Opportunity has been taken to test these against the more usual practices.

Experiments were laid down at Titi Serong and Briaah with a view to testing the practicability of employing dry or semi-dry nurseries under Krian conditions. There were three treatments of 1/40th acre plots with four replications, the treatments being as follows :

- (a) Wet raft (*rakit*) nurseries with multiple transplanting, the common practice in Krian.
- (b) Dry or semi-dry nurseries sown at the same time as (a) but transplanted directly to the field.
- (c) Dry or semi-dry nurseries sown thirty-two days later than (a) and (b) and with direct transplanting timed to coincide with the final transplanting of (a).

Details of results are given in Table III.

No significant results were attained as between treatments, but in so far as the season under review is concerned, the following points were established :—

- (a) Ordinary nursery methods and direct planting into the field therefrom (as distinct from the *rakit* nursery method and several transplantings) are practicable in Krian.
- (b) The maturation period of a strain varies with conditions even in the same locality.
- (c) Several transplantings are not necessary in Krian to induce grain formation. Reference to the following table will show that padi transplanted direct from the nursery gave as high a yield as that subjected to several transplantings. Briaah figures are less reliable than those from Titi Serong owing to rat damage sustained at the former.

This applies more especially to treatment (b) at Briah.

The experiment will be repeated at both Stations during the current season (1934-35).

Table III.

Comparison of Wet and Dry Nurseries.

Type of Nursery	Station					
	Titi Serong			Briah		
	Mat. period in Days.	lbs per 1/40th acre	Percentage of G.M.	Mat. period in Days.	lbs per 1/40th acre	Percentage of G.M.
A. Wet raft (rakit) nurseries with multiple transplanting. The common Krian practice ...	230	72.9	95	215	46.4	105
B. Dry or semi-dry nurseries sown same time as A. but transplanted directly to field ...	230	78.1	102	209	41.2	93
C. Dry or semi-dry nurseries sown 32 days later than A & B. Transplanted directly to field at same time as final transplanting in A. ...	204	78.6	103	193	48.6	110
General Mean ...		76.5	100		44.1	100

Effect of Bunds on Yields.

In parts of Krian where the vegetative growth during the fallow season between crops is heavy, it is customary only partially to rot the cut vegetation in the field and then to remove the larger portion of it to the bunds separating the fields. Thus, such bunds receive a yearly addition of partially rotted vegetation so that the larger portion of the material composing it is decaying vegetation resembling in appearance well rotted farmyard manure. Continuous detrition from this results in a gradual slope from the bunds towards the middle of the field, though the difference in level between the middle and edge of the field probably never exceeds six inches.

Under such conditions it is reasonable to suppose that heavier yields due to increased soil fertility will be obtained near the bund; that from the bund towards the middle of the field there will be a decreasing fertility curve, and that this curve will be reflected in crop yields. Such a curve is indicated by the vegetative growth of the crop, and that it would also similarly appear in crop yields has been the general assumption.

Recent manual experiments have clearly shown, however, that increased vegetative growth is often not accompanied with increased grain production.

A harvesting experiment intended to give an indication as to how far bund proximity affected yields was conducted. Twenty-five lines of plants running parallel to a bund were reaped separately and their yields recorded. This was duplicated for another twenty-five lines running parallel to the same bund. Line 1 in each case was nearest the bund and line 25 furthest from it, being distant 24 feet. Yields recorded show a distinct decrease with distance from bund. The yields obtained, arranging the lines in groups of five, are shown in Table IV.

Table IV.
Effect of Bunds on Yields.

Block A.		Block B.	
Lines	Yields in lbs.	Lines	Yields in lbs.
1—5	17.1	1—5	16.4
6—10	12.4	6—10	11.9
11—15	11.4	11—15	11.
16—20	9.3	16—20	8.1
21—25	7.8	21—25	7.2

The above results are strikingly confirmed by a very definite gradient for columns exhibited in certain varietal trial Latin Squares at Titi Serong. The squares examined in this connexion were situated with one of their sides at distances ranging from $8\frac{1}{2}$ to 33 feet from the bund.

Other Investigations.

Palatability and Milling Qualities of Rice.

The desirability of obtaining information regarding the palatability of the high yielding pure strains isolated by the Department and on their milling qualities has become increasingly recognised and has received some attention. On the question of palatability, tasting trials conducted during the past few seasons have shown that whilst a few strains are fairly generally recognised as of poor eating quality, opinion regarding the majority varies considerably with the locality and with the nationality and circumstances of the taster.

One of the strains that is generally recognised as of poor eating quality is Radin 7, and this fact militates against this strain becoming popular with cultivators, although in many trials it has proved to be the heaviest yielder of all the Radin pure strains so far isolated.

The planting programme for the Perak Padi Experiment Stations and Test Plots for next season has included provision for producing sufficient padi of a number of the more important pure strains with a view to conducting milling tests with them at Bagan Serai Mill. The strains concerned are :—Seraup 15, 36, 48; Radin 2, 4, 7; Siam 29, 76 and Mayang Ebos 203.

Kedah.

Telok Chengai Experiment Station.

The padi season at the Telok Chengai Station was a good one in 1933-34. The rainfall was well distributed and little damage was done by pests and diseases. Heavy rains accompanied by strong winds, however, occurred at the beginning of January, 1934, when all the varieties of padi were in ear, and proved a severe test of the strength of the straw of the different strains.

The local and Krian selections withstood the wind and rain remarkably well as also did the newly-introduced Malacca selection Siam 76. The Malacca Nachin 66 lodged completely. The Radin Siak selections from the same source lodged partially, and of these, Radin Siak 7 was the least affected.

Except for showers at the beginning of the harvest the weather later was fine and dry.

Of the new selections tested, Siam 76 and Radin Siak 7 are likely to prove of value locally.

The yields as a whole were higher than in any previous season. Of the fifteen strains which yielded at the rate of over 500 gantangs per acre, ten were local selections; four were from Malacca and one from Krian. The highest yields were obtained from one Malacca padi, Siam 29, and two Kedah ones, *viz.* Reyong 20 and Radin China 4; these returned 623, 622 and 620 gantangs per acre respectively. Owing to the prolonged wet season the Krian long-termed varieties of padi, but more especially Seraup Kechil 48, gave higher returns than were usual at Telok Chengai. As the varieties were grown in single plots of unequal dimensions situated in different parts of the Station, the yield-results cannot be compared by the usual statistical methods in order to ascertain whether the high yields of certain of the selections were significant; the trials, however, apart from their usefulness in providing seed for distribution, have served to indicate the general field and yield characters of the varieties under local conditions.

Padi Test Stations.

In addition to the Experiment Station at Telok Chengai, Test Stations have been maintained in the chief padi-growing districts in the State, both for the purpose of experimentation, and to serve as centres for the multiplication of selected strains which have demonstrated superior qualities under local conditions.

At all Stations a good season was experienced, except at Salak Kanan where deep water checked growth and adversely affected yields in several plots.

Lenggong Test Station.

At this Station, observations and yield returns from Siam 29, Nachin 10 and Serendah 824, which were quadruplicated in 1/45th acre plots, confirmed results obtained from a Latin Square experiment in which these varieties were tested against a popular unselected local padi, To Seman, in a varietal-cum-manurial experiment. As a result of these tests, Nachin 10 and Siam 29, which exhibited marked superiority, will be used for extensive distribution in the district.

Jitra Test Station.

Tests of the following varieties were made in a checker board planting arrangement of 1/45th acre plots, each replicated five times:—Subang Intan, a round-grained heavy-yielding local variety, resembling Nachin 10, but one that realises low prices, Radin 4 and the Telok Chengai selections Mayang Ebos 80, Radin China 17, Radin Che Nah 79 and Reyong 36.

The highest mean yield was obtained from selected Mayang Ebos 80 with a calculated return of 684 gantangs per acre. All of the others, however, including Subang Intan, produced over 600 gantangs per acre, with the exception of Radin 4, which yielded 398 gantangs per acre only.

Table V shows the relative yields.

Table V.
Relative Yields from Test Stations, Kedah.

Station	Variety	Yield per acre gantangs	Percentage by Volume	Station	Variety	Yield per acre gantangs	Percentage by Volume
Jitra	Radin 4	398	100	Rantau	Siam 29	581	129
	Mayang Ebos 80	684	172	Panjang	Nachin 10	574	128
	Radin China 17	623	157		Serendah 824	450	100
	Radin Che Nah 79	614	154		Anak Kuching	510	113
	Reyong 36	623	157		Ibu Kuching	502	112
	Subang Intan	632	159	Pulai	Jarum Mas	529	100
Salak	Seraup Kechil 36	427	100		Serendah Sg. Dua	597	112
Kanan	" " 48	456	106		Reyong 6	728	137
	Seraup Besar 15	472	110		Siam 29	727	137
					Nachin 10	645	122

Owing to the good results recorded from Mayang Ebos 80 it is anticipated that the demand for seed for planting will be considerable. This padi realises full market prices.

Salak Kanan Test Station.

The site of this Station is in an area fairly recently reclaimed from "gelam" (*Melaleuca leucodendron*). The soil is soft and no implements are as yet used for cultivation. Water supplies are abundant and often lead to the submergence of seedlings after planting in low-lying areas. Long-term seven months' varieties are chiefly grown. Results of growing selected Krian strains of "Seraup" have not proved very satisfactory although yields above the average for the district have been obtained. Cultivators do not favour the Seraup varieties, chiefly on account of the lower prices realised when sold to local millers as compared with the longer grained varieties, such as Mayang Ebos and Radin China; also the rices are not considered to be very palatable.

The three selected strains cultivated in a checker-board arrangement of 1/45th acre plots, with ten replications of each were:—Seraup Besar 15, Seraup Kechil 36, Seraup Kechil 48.

The plot yields were very uneven due to deep-water. Seraup Besar 15 gave the highest yields, namely, 473 gantangs per acre, followed by Seraup Kechil 48 with 457 gantangs per acre. The results, which are not significant, are shown in Table V.

It is proposed to discontinue this Station owing to the difficulties encountered with deep-water, and endeavour to open a new station in the district where better water control is available.

Rantau Panjang Test Station.

A good season was experienced at this Station, more especially as no flooding from the Muda River occurred. The local varieties and selected strains cultivated in a checker-board arrangement of plots were, Siam 29, Nachin 10, Serendah 824, and the popular local varieties Anak Kuching 9 and Ibu Kuching. The yields, which are given in Table V, were good for the area.

The superior yielding characters of Siam 29 and Nachin 10 over the local varieties were again demonstrated, and it is likely that the cultivation of Siam 29 will become very popular in the district. For this reason, the number of 1/45th acre plots of Siam 29 grown was twelve as against six replications of each of the other varieties, in order to obtain supplies of seed for distribution.

Pulai.

A small Station was opened along the main road at Pulau near Baling in a district where no selected padi had hitherto been grown, or cultivation and manurial trials made. Five varieties were planted in quadruplicate in plots of 1/45th acre each, of which one half of each plot was planted with seedlings from a dry nursery and half from a wet nursery. Dry nurseries only are

used by planters in the district. Although far larger plants were obtained from the wet nursery there were no significant differences between the yields of the plots planted with dry and wet nursery seedlings respectively.

The varieties planted were Serendah Sungei Dua, Jarum Emas, Reyong No. 6, Nachin 10 and Siam 29. The two former are popular local varieties. The yields recorded were so high, namely over 500 gantangs per relong (700 gantangs per acre) in two cases, that for this class of land they can hardly be accepted without further trial. It can confidently be stated, however, that the selected varieties Reyong 6, Siam 29 and Nachin 10 gave much higher yields than the two local varieties.

The average calculated yields as given are shown in Table V.

The opening of this new Station and the experiments carried out aroused much interest in the district, and demands for seed of Siam 29 and Reyong 6 have already been made.

Malacca.

Varietal Trials.

A Latin Square of standard lay-out, but of 1/360th acre plots instead of 1/120th acre in order to accommodate the block in one plot, was planted to compare the best strains of the different varieties selected to date at this Station, namely Siam 29, Siam 76, Nachin 66 and Nachin 11, together with F. 824 a Titi Serong selection, which has given good yields at Pulau Gadong in the past.

The results showed no significant difference in yield between Sm. 29, N. 66 and N. 11, the highest yielders, but on account of adverse conditions, little weight can be given to this result. The trial will be repeated next season.

Selection Work.

Ear-to-row work was in progress on five varieties, namely Siam, Nachin, Radin Siak, Milek Puteh and Milek Kuning.

Padi Siam. Second series of selections. A popular 7 months Malacca variety. This was the third season of work on this series. Only two lines remained under trial, and this season's results showed that neither was superior to the best of the first series of selections—namely Siam 29. This completes work on this series.

Padi Nachin. Second series of selections. A popular 7 to 7½ months Malacca variety. This was the third season of work on this series. Thirteen lines remained under trial. None were outstanding, but four have been selected for comparison in a Latin Square in the coming season with the best of the first series—namely Nachin 66.

Padi Radin Siak. A short padi 5½ to 6 months commonly grown in Malacca when early maturation is required or water shortage is anticipated. This was the fifth season of work on this variety. Sixteen lines remained

under trial and of these, five will be tested further in a Latin Square in the coming season.

Latin Square trial of Radin Siak and Milek Puteh Strains. Table VI gives a summary of the results obtained from a Latin Square of eleven of the lines under trial.

Table VI.

Pulau Gadong Experiment Station, Malacca.

Summary of Results from Radin Siak (R.S.) and Milek Puteh (M.P.) Lines.

Mean Yield (M.Y.) in Kilos per 1/360th acre; Percentage of General Mean (P.G.M.); General Mean (G.M.) in Kilos; Standard Deviation (S.D.) as Percentage of the General Mean; and Minimum Percentage Difference for Significance (M.S.D.).

	Square	Strains					Square	Strains			
		R.S. 17	R.S. 24	R.S. 34	R.S. 18	R.S. 7		R.S. 17	R.S. 69	R.S. 9	R.S. 25
M. Y.	1	3.4	3.1	3.8	3.1	3.3	2	3.5	3.5	3.0	3.6
P.G.M.		102	93	112	92	98		104	104	86	107
G.M = 3.3, S.D=6.7, M.S.D. = 9.6						G.M. 3.4, S. D. 5.0 M.S. D. 8.7					
		R.S. 17	R.S. 16	R.S. 100	R.S. 1			M.P. 1	M.P. 8	M.P. 3	M.P. 7
M.Y.	3	2.8	2.4	2.5	2.5		1	2.7	3.7	3.0	3.6
P.G.M.		109	95	96	99			80	113	95	112
G.M=2.5, S.D=6.5, M.S. D. 11.3						G.M.=3.2 S. D.=0 M.S. D.=0.					
		M.P. 9	M.P. 15	M.P. 12	M.P. 14						
M.Y.	2	3.8	3.4	3.3	3.4						
P.G.M.		109	98	98	98						
G. M = 3.5 S.D = 7.4, M.S.D. = 12.8											

Radin Siak 34 is significantly better than any other strain, and Radin Siak 9, 16 and 100 are significantly worse than any other strain. On this and past results a further confirmatory trial next season will be confined to Radin Siak 34, 7, 17, 25 and 69.

Padi Milek Puteh. A 7 months variety commonly grown in the east coast region of Pahang. Third year of selection. Twelve lines remained under trial, and of these, seven will be continued next season.

In the coming season, Milek Puteh 7, 8, 9, 12, 14 and 18 will undergo further trial for yield. M.P. 11, an early maturation strain, is also retained, for inclusion in a varietal trial of early maturing varieties.

Padi Milek Kuning. A 7½ to 8 months variety commonly grown in the coast region of Pahang. Third year of selection. Four lines remained under trial, and of these Milek Kuning 3 was outstanding, and selection on this series is therefore completed.

Preliminary Selection on Padi Serendah.

This is a variety commonly grown in the inland regions of Alor Gajah District, Malacca. It is a heavy yielding, dwarf padi, but owing to the irregularity of ripening, has to be harvested with the *tuai* (a small cutting instrument with which heads of grain are cut singly). The object of selection is to obtain a high-yielding strain of even ripening. About 1,500 single plants were planted out in rows, and from these 200 were selected for further examination, and about 100 will be planted for ear-to-row selection in the coming season.

Observation Lines of Java Padi.

Ear-to-row lines of the Java varieties Tong San, Oerang Oerang and Kar Serang were grown for observation and acclimatisation. They are 6 months varieties in Java, but matured in 14 weeks in Malacca. Growth was weak and yields were poor. Small plots have been replanted for further acclimatisation.

Pahang.

Drought conditions following the establishment of nurseries delayed the preparation of fields and resulted in a somewhat late planting and decreased area under crop. Following the dry period, very heavy late rains fell in May, causing some minor flooding but no appreciable crop damage. Although growing conditions were not favourable, more particularly in areas without water control facilities, satisfactory yields were obtained.

Dong Padi Test Plot.

Seventeen pure strain selections were tested against two local varieties of padi, Gandar and Jambak Bawang, in five four-way standard Latin Squares.

As yields were measured and not weighed, results are liable to be obscured owing to variations in densities of different strains.

Siam 29 again gave the highest yield, and has proved a successful and popular padi among cultivators. As this strain tends to lodge, trials of Siam 76 were made: the latter variety, although possessing a stronger straw, gave a much lower yield, and so far has not justified a preference over Siam 29.

Nachin 10, although a good yielder lodged badly. Nachin 66, which is reported to have much more robust straw, was laid to practically the same extent, and gave a much lower yield.

Of the local varieties of padi, Gandar proved to have a shorter maturation period and an increased yield over Jambak Bawang.

Results from S.K. 36, Radins 2, 4, 13 and Pahit 1 are now fairly constant, so these will not be tested next year. A further trial of the best of the Radin Siak, No. 24, will be made, for although this variety is not very suitable for the Raub District, it may prove eminently suited to the riverine mukims, owing to its short maturation period of 190 days.

Maturation periods of the majority of types were slightly increased, due to excess of water on the land just prior to and during the ripening period.

Table VII gives the maturation period of each strain and results obtained from squares.

Table VII.
Dong Test Plot, Pahang.

Maturation Periods (M.P.) in days. Mean Yields (M.Y.) in gantangs per 1/120th acre and the Comparative Percentage of General Mean (P.G.M.).

Square		Strain				Square		Strain			
		S.K. 36	R. 4	P. I.	J. B.			R. 2	R. 13	M.E. 210	J. B.
A	M.P.	264	250	244	250	B	M.P.	234	252	236	255
	M.Y.	4.38	4.	3.75	3.38		M.Y.	3.25	4.	3.71	3.38
	P.G.M.	113	104	97	87		P.G.M.	91	112	103	95
		S.M. 29	N. 66	S.M. 76	N. 10			F.S. 875	N. 272	F.S. 12	G.
C	M.P.	231	232	231	231	D	M.P.	194	196	194	234
	M.Y.	5.5	3.81	4.06	4.5		M.Y.	3.69	2.69	3.56	3.94
	P.G.M.	123	85	91	101		P.G.M.	106	78	103	113
		R.S. 7	R.S. 17	R.S. 18	R.S. 24	S.K. = Seraup Kechil. R. = Radin. P. = Pahit. J.B. = Jambak Bawang. M.E. = Mayang Ebos. Sm. = Siam. N. = Nachin. G. = Gandar. R.S. = Radin Siak. F.S. = Foundation Stock.					
E	M.P.	190	190	190	190						
	M.Y.	2.88	2.88	2.94	3.38						
	P.G.M.	95	95	97	112						

From inspection of records, significant differences may be expected to be about 20 per cent.

Temerloh Padi Test Plot.

The lay-out of this Station was not altered to the Latin Square system as topography did not permit. Seven selections were tested against a local Seri Ayer in 1/40th acre plots, each variety being replicated nine times, with the exception of S.K. 36.

Harvesting and planting were delayed somewhat owing to deep water.

Yields returned from the selected varieties were, in all cases, below that from the local Seri Ayer. As a result of a more suitable planting date being adopted the yield from Nachin 27 was very much better than in previous years. The yield from F.S. 875 dropped owing to excess water, and it now appears that this strain is only suited to shallow fields.

The only strains worth further trial are: Nachin 27, F.S. 875 and Radin 2, while the local Seri Ayer has proved fit for selection work. Summarised yields were as follows:—

Table VIII.
Temerloh Test Plot.

Maturation Periods in days and Calculated Yield in gantangs per acre.

Strains	Seri Ayer	Radin 2	N. 27	Radin 13	Seraup Kechil 36	F.S. 875	Radin 7	Radin 4
Maturation periods—days ...	257	241	191	295	309	203	283	310
Calculated yield per acre—gtgs.	399	332	327	304	301	290	266	249

Pekan Test Plot.

Eighteen selections were tested against two local varieties of padi, Seri Ayer and Milek Puteh, in five four-way standard Latin Squares.

Yields were below those for the previous season due to unfavourable conditions at time of harvest, and to the fact that many of the selections were new to the district.

Summarised results are given in Table IX. From these may be deduced the following:—

Square A.—Milek Puteh was significantly better than any of the other three strains which were all approximately equal.

Square B.—Milek Puteh 11 was significantly worse than any of the other three varieties which among themselves were approximately equal.

Square C.—N. 66 was significantly better than the other three strains, while M.E. 210 is nearly—but not quite—significantly inferior to Siam 76.

Square D.—Seri Ayer is significantly better than Serendah 824 and not quite significantly better than F.S. 875.

Square E.—R.S. 24 is significantly better than any of the other three.

Radin Siak 24 and N. 66 lodged slightly but no grain was lost. Padi Pahit proved to be unsuitable for local conditions. Tillering was much below average and may have been due to close planting. This, however, was the usual spacing for the district.

Table IX.

Pekan Test Plot.

Maturation Periods and Mean Yields of Padi.

Maturation Periods (M.P.) in days; Mean Yield (M.Y.) in pounds per 1/120th acre; General Mean (G.M.) in pounds; Standard Deviation (S.D.) in pounds; and Minimum Significant Difference (M.S.D.) in pounds.

Square		Strain				Square		Strain			
		M.P. (L)	P.P 1	Radin 2	Radin 13			M.K. 3	M.K. 2	M.P. 4	M.P. 11
A	M.P.	235	254	210	245	B	M.P.	250	250	230	220
	M.Y.	11.9	8.1	8.2	8.4		M.Y.	13.3	12.7	12.5	8.2
G.M. = 9.1, S.D. = 1.15, M.S.D. = 2.						G.M. = 11.7, S.D. = 1.86, M.S.D. = .31.					
		M.E. 210	Nachin 66	Siam 29	Siam 76			S.A.	F.S 875	N. 27	Sr. 824
C	M.P.	225	225	225	217	D.	M.P.	195	195	190	210
	M.Y.	7.6	12.5	8.2	9.7		M.Y.	8.5	7.4	7.7	6.7
G.M. = 9.5, S.D. = 1.29, M.S.D. = 2.2.						G.M. = 7.6, S.D. = .68, M.S.D. = 1.2.					
		R.S. 24	R.S. 18	R.S. 7	R.S. 17	M.P. = Mileh Puteh, (L) = Local, M.K. = Milek Kuning, M.E. = Mayang Ebos, S.A. = Seri Ayer, F.S. = Foundation Stock, R.S. = Radin Siak, Sr. = Serendah, N. = Nachin.					
	M.P.	175	75	175	175						
	M.Y.	12.8	9.4	8.5	8.9						
G.M. = 9.9, S.D. = 1.39, M.S.D. = 2.4.											

Sungei Blat Padi Test Plot.

Thirteen selections were tested against three local varieties of padi—Chendar, Hemar and Milek Puteh—in four four-way standard Latin Squares.

Little reliance can be placed on the results, as planting dates were unsuitable and the later sown varieties—Milek Puteh and Radin Siaks—were completely destroyed by birds and rats.

Maturation periods of the long term varieties were very much increased as a result of keeping the seedlings in the nurseries too long.

Table X.

Sungei Blat Test Plot.

Maturation Periods (M.P.) in days and Calculated Yield per acre (C.Y.A.)

	Square	Strain				Square	Strain			
		S.K. 36	Radin 2	Radin 13	Chendar		Siam 29	Siam 76	Nachin 66	Hemar
M.P. C.Y.A.	A.	343 285	218 252	251 127	243 435	B.	218 395	218 302	218 337	244 221
		F.S. 875	Sr. 824	N. 27	M.P.					
M.P. C.Y.A.	C.	211 170	211 137	211 180	No crop " "					

Kelantan.

Varietal Trials.

Central Experiment Station, Kota Bahru.

In the wet rice trials for varieties with a long and medium period of maturation, eleven imported pure strains were tested in standard Latin Squares with a view to the isolation of strains best suited to local conditions. The land selected for the experiment received a dressing of bat guano at the rate of four hundredweights per acre harrowed into the soil on the day prior to the commencement of transplanting. The crop made satisfactory progress, but on nearing maturity, high winds and heavy rains caused a certain amount of lodging. Rats became established under the fallen straw, and were responsible for an appreciable loss of grain.

Statistical analysis was not undertaken but the following table indicates the performance of the strains tested:

Table XI.

Central Experiment Station, Kota Bahru, Kelantan.

Maturation Period in days. Average Yield in pounds per 1/120th acre and Calculated Yield per acre in gantangs.

Strains	Seraup 86	Seraup 15	Seraup 48	Radin 4	Radin 2	Siam 29	Radin 13	M. Ebos 203	Siam 76	Nachin 27	Nachin 6
Maturation period—days ...	183	183	181	178	176	174	174	171	174	174	171
Average yield in lbs 1/120th acre	34.3	30.9	28.5	23.9	22.3	21.8	20.9	19.9	19.7	17.5	15.7
Calculated yield p.a. in gts. ...	698	618	570	472	459	436	418	398	394	350	314

Although damage by pests and weather obviated a critical appreciation of the yields from the strains under trial, the behaviour of the first six gives some indication as to their possibilities under Kelantan conditions, and further trials to establish definite superiority will be undertaken.

In trials of short term strains six varieties of padi were under test in standard Latin Square lay-out, and included Acheh, Jambu, Radin Siak 24, Radin Siak 18, Radin Siak 17 and Radin Siak 7. Unfavourable weather conditions on a well-developed and maturing crop caused considerable lodging and much loss of grain. As a consequence of this damage, yields were very irregular and no useful results were obtained.

In view of the importance of dry padi cultivation in Kelantan standard Latin Square trials to test ten varieties were laid down. Damage by birds rendered results unreliable and further trials will be undertaken.

Pasir Puteh Experiment Station.

Trials comprising seven pure strains and eight local varieties of wet padi were undertaken at this Station, but again pest damage rendered results unreliable. Further work on similar lines will be undertaken during the current season.

Selangor.

Varietal Trials.

Kajang Test Plot.

At this Plot Nachins 27 and 756 and Padi Acheh were tested against an unselected Radin Siak in a standard four-way Latin Square.

All varieties made excellent growth under favourable weather conditions, pest damage being negligible.

It was considered that the results did not warrant statistical analysis. The superiority of Nachin 27 was apparent however, with a strong probability of significance.

Further selection of Padi Kelantan and Serendah 824 was undertaken during the season, as was also preliminary selection of two local varieties of padi—Kelantan and Acheh.

Kuang Padi Test Plot.

The following trials in standard Latin Square lay-out were undertaken, Nachin 27 being the standard of comparison common to all trials:—

Square A. Serendah 824, F.S. 875, Nachin 10, Nachin 27.

„ B. Kelantan, Radin Siak, Acheh, Nachin 27.

„ C. Nachin 756, Radin Siak, Acheh, Kelantan, Nachin 27.

„ D. Nachin 10, F.S. 741, F.S. 875, Serendah 824, Nachin 27.

Extensive damage by insect pests and birds masked results to such an extent that critical examination was not undertaken. A further series of trials will be laid down during the current season.

Preliminary selection of two local varieties of padi, Kelantan and Acheh, was carried out.

Nagri Sembilan.

In the District of Jelebu, which observes a planting season some three to four months in advance of the remainder of the State, weather conditions at the commencement of the season were not favourable to nursery development or cultural operations in areas where adequate water control was not available. The crop which matured late in the year as a result of these circumstances, was almost completely laid by heavy rains and suffered much loss of grain.

In other Districts favourable conditions were experienced and satisfactory crops obtained.

Jelebu Padi Test Plot.

Owing to various difficulties experienced during the course of preparing the land for planting, the standard trials arranged for this plot were largely abandoned, and a modified programme using short term Radin Siak from Malacca was substituted.

In the single trial laid down for strains with a medium maturation period, F.S. 875, Radin 2, Nachin 10, Radin 13 and Siam 29 were tested against a local Serendah, but owing to early and extensive rat damage, and a particularly wet harvest, results were of no value for critical examination.

In the trials undertaken with the short term Radin Siak, growth and development were satisfactory, and no extensive rat damage was experienced. The maturing crop, however, was exposed to frequent heavy rains during November and December and was completely lodged prior to harvest. From an examination of results, although no significant difference existed between the strains,

some apparent indications of superiority were observed in Radin Siak Nos. 9, 17 and 18 and these will be tried against further selections of similar strains during the 1934—35 season. Owing to loss of crop due to the circumstances already described, variations were too large to warrant statistical examination.

Kendong Padi Test Plot.

Standard trials were laid down as follows:—

- (i) Seraup Besar 15, Seraup Kechil 48 and Seraup Kechil 36 were tested against Radin 13.
 - (ii) Radin 2, Nachin 66 and Siam 29 were tested against a popular local padi known as Serendah Kuning.
 - (iii) F 874, F 11 and F 28 were tested against the local Serendah Kuning.
- In addition a comparative trial of short term Radin Siak selections from Malacca, including Radin Siak 7, 17, 18 and 24 was undertaken.

Owing to the variable nature of the soil on this Plot, the standard series of experiments was carried out in triplicate, one set being on shallow, one on medium and one on deep soils. Unfortunately, the deep and medium soils suffered from severe flooding early in the growing period, while the shallow areas, being adjacent to the overgrown banks of the river, were badly attacked by rats.

Statistical examination of results was not undertaken in view of the damage sustained, but an attempt to obtain more conclusive results from the same series will be made during the season 1934-35.

Province Wellesley.

Bukit Merah Padi Test Plots.

Four standard Latin Squares were laid down to test the following:—

- Square A. Long maturing strains.
Seraup 15, 68, 48, and 36.
- Square B. Medium maturing strains.
F. 63, Siam 76, Nachin 66, Siam 29.
- Square C. Medium maturing strains.
Nachin 756, Mayang Ebos 203, Serendah 824, Radin 13.
- Square D. Short maturing strains.
Radin Siaks 17, 7, 18, 24.

Results obtained from the long-term strains indicated no significant superiority of any strain. Owing to lack of uniformity of water distribution it is considered that the land at this Station is not suited to the cultivation of varieties of padi with a maturation period of eight months, as the performance of this type of rice has in the past been only moderate.

In Square B Siam 29, which has consistently yielded satisfactory crops at this Plot, exhibited superiority over Siam 76, but not over F. 63 and Nachin 66. The consistent performance of Siam 29 under the conditions present at

Bukit Merah, which are similar to those of the greater part of Province Wellesley North and Central, together with its attractive appearance and excellent eating qualities makes it a safe and desirable strain for distribution, although it suffers from a tendency to lodge under unfavourable weather conditions.

Among the strains tested in square C., Mayang Ebos 203 achieved significant superiority over the remaining varieties of padi, while Nachin 756 established a clear significant superiority over Radin 13 and bare significance over Serendah 824. As Mayang Ebos 203 and Serendah 824 have not been included in previous critical trials, further work with these strains will be undertaken. The former is a selection from one of the most widely cultivated varieties in Province Wellesley North.

In the square devoted to short term varieties, Radin Siak 17 and Radin Siak 18 were significantly better than R.S. 7 and 24.

Details of above trials are as follows:—

Table XII.

Bukit Merah Test Plot, Province Wellesley.

Maturation Period (M.P.) in days; Percentage of General Mean (P.G.M.); General Mean (G.M.) in pounds per 1/120th acre; Significant Difference as Percentage of General Mean (S.D.); and Minimum Percentage for Significance (M.S.D.).

	Square	Strains				Square	Strains			
		Seraup 15	Seraup 68	Seraup 48	Seraup 36		F. 63	Siam 76	Nachin 66	Siam 29
M.P.	A	216	215	215	218	B	173	171	173	168
P.G.M.		104	90	101	104		99	97	98	106
G.M.=19.9 S.D.=1.0, M.S.D.=17						G.M.=22.6 S.D.=5, M.S.D.=9				
		Nachin 756	M.E. 203	SR. 824	Radin 13		R S. 17	R.S. 7	R. S. 18	R S 24
M.P.	C	171	172	173	172	D	159	159	159	163
P.G.M.		103	109	97	92		106	95	108	91
G.M.=20.0 S.D.=3.2, M.S.D.=6						G.M.=17.5 S.D.=6.5, M.S.D.=10				

Penang
Varietal Trials.
Glugor Padi Test Plot.

At this Plot trials were carried out in standard Latin Squares of the following pads :—

- Square A. Long maturation strains.
Seraup 15, 36, 48, and 68.
Square B. Medium maturation strains.
Siam 76, Radin 2, Nachin 66, Radin 4.
Square C. Medium maturation strains.
Serendah 824, Mayang Ebos 203, M.E. 202, Nachin 756.
Square D. Short maturation strains.
Radin Siak 24, 18, 7, and 17.

Of the strains with a long maturation period, Seraup 48 gave significantly higher yields than the remainder. Further trials are indicated with a view to ascertaining whether this superiority can be definitely established over several seasons. Seraup 15 is widely grown in Penang Island under the name "Sake-poy" and if Seraup 48 proves to be a higher yielder it might replace the former to a considerable extent.

Table XIII.
Glugor Test Plot, Penang.
Varietal Padi Trials.

Maturation Period (M.P.) in days; Percentage of General Mean (P.G.M.); General Mean (G.M.) in pounds per 1/120th acre; Significant Difference as Percentage of General Mean (S.D.); and Minimum Percentage of Significance (M.S.D.).

	Square	Strains				Square	Strains			
		Seraup 36	Seraup 48	Seraup 68	Seraup 15		Siam 76	Radin 2	Nachin 66	Radin 4
M.P.	A	233	233	233	233	B	188	188	188	208
P.G.M.		96	112	95	96		93	92	107	108
G.M. = 16.5, S.D. = 6.5, M.S.D. = 10.						G.M. = 15.4, S.D. = 9.1, M.S.D. = 16				
		Sr. 824	M.E. 203	M.E. 202	Nachin 756		R.S. 24	R.S. 18	R.S. 7	R.S. 17
M.P.	C	201	201	201	201	D	146/155	146/149	146	146/149
P.G.M.		103	92	114	89		91	110	96	103
G.M. = 15.7, S.D. = 16.8, M.S.D. = 29.5						G.M. = 19.3 S.D. = 7.6, M.S.D. = 13.2				

In square B, R. 4 confirmed the results of the previous season by maintaining superiority over R. 2. It did not, however, gain significance over the other strains under trial in the same square.

In the medium maturation strains under trial in square C the experimental error was extremely large. None of the differences were significant, though Mayang Ebos 202 was apparently superior to both Mayang Ebos 203 and Nachin 756.

Of the short maturation strains under trial in square D, Radin Siak 18 gave significantly higher yields than Radin Siak 17 and Radin Siak 24. The yields from this square were unexpectedly high, attaining an average equivalent to 393 gantangs per acre.

Results obtained from the trials conducted at Glugor Padi Test Plot are set out in Table XIII.

APPENDIX.

Padi Hybridization Experiments at Titi Serong 1933-34.

The hybridization experiments continued at Titi Serong Padi Experiment Station, Krian, are in the charge of the Assistant Botanist, Kuala Lumpur, but supervision of sowing, planting and growth throughout the season is given by the Agricultural Officer now permanently stationed in Krian.

Selections were made in January 1934 (Season 1933-34) from the F_4 generation ear to row lines of hybrids obtained during the 1929-30 season.

All heterogeneous lines were cut out; then any lines showing weakness of straw, evidenced by a tendency to "lodge" easily, were eliminated.

The best homozygous lines were then chosen, largely by visual observation, as there was little difficulty for the most part in picking out the best of these lines for habit and crop. Where it was not easy to estimate the comparative value of the crop visually, the ears from ten consecutive plants in the centres of the rows were harvested and comparative figures for weight of crop obtained. Consideration was also given to "earliness"; height of plants; type of ears; and type of grain.

The F_2 generation from more recent cross-pollinations was also examined. Plants from the supposed Nachin 27 x Radin 2 cross were found to be homozygous and like Nachin 27, and were, therefore, discarded as not being "crossed".

The plants from the Siam 875 x Siam 29 had in the F_1 generation given two types of grains. On account of the consequent doubt as to their percentage, a detailed examination was not made; but as both lots of plants were heterogeneous, showing that apparently both were the progeny of some cross-fertilisation, and as certain plants appeared to have stronger straw than the majority, a few plants with strong straw and Siam type grain were selected and ears from each were retained for seed.

The plants from the Radin 2 x Siam 29 "cross" were examined plant by plant in the field.

The type of grain was notable as it all was of a shape similar to Radin 2; no segregation of the more slender typical Siam type was found. (Average dimensions of the two types are: Radin 2, 8 mm. long, 2.75 mm. broad and 2 mm. thick and Siam 29, 9 mm. long, 2.5 mm. broad and 2 mm. thick).

As regards colour of grain, however, segregation was 223 plants with straw-coloured grains to 695 plants with creamy white grains. These figures again approximate very closely to the simple Mendelian ratio, and show white colour to be a simple dominant to straw-colour in padi grains.

The straw character was not so easy to follow on account of the plants being badly lodged near the batas*, but a count showed approximately 140 strong-strawed plants to 600 plants with weak or spreading straw. The only con-

* Batas.—Low boundary walls, composed largely of humus in North Krian.

clusion that can be formed from these figures is that strong straw and weak straw are probably not simple allelomorphic characters.

Fourteen plants with white grains and with strong straw were selected and ears were reaped for seed for the next season.

The grain resulting from the Nachin 10 x Nachin 27 cross-pollinations made in December 1933 were harvested in January 1934; this "cross" was made in an endeavour to combine the high yielding character of N10 with the strong straw of N27. Fifty-four flowers out of the hundred that were crossed had set good grain. These grains were sown in August 1934 but failed to germinate and the seed may have been non-viable, but a more carefully guarded method of sowing was formulated for future occasions.

The artificially cross-pollinated padi flowers have had the tips of the lemma and the palea cut off to enable emasculation and pollination to be done without vitally injuring the flower. This leaves the top of subsequently formed grain protruding and the grain generally somewhat exposed so that it is readily attacked by fungi unless precautions are taken when the grain is brought in contact with moist conditions at sowing.

Abstracts.

THE EXPORT CROPS OF THE NETHERLANDS INDIES IN 1933.

Bulletin No. 122 of the Central Bureau of Statistics of the Netherlands Indies.

The total value of agricultural exports in the year under review was Gs. 306,000,000, as compared with Gs. 385,000,000 in 1932 and Gs. 1,237,000,000 in the peak year of 1928. The total volume of these exports amounted to 3,225,331 metric tons in 1933, or 455,591 metric tons less than in the previous year. The crop chiefly responsible for this decline in exports was sugar, the exports of which declined by 493,000 tons. The following crops also showed a decline in exports by the amount (in tons) stated against each:—gapelek (dried tapioca root), and gapelek meal 84,000, maize 63,000, sago 42,000, coffee 40,000, "krosok" tobacco 16,000, coconut oil 7,800, tea 7,000. On the other hand, the following increases of exports in 1933 over those of 1932 are recorded (in tons):—rubber 70,000 and latex 5,000, palm oil 31,000 and kernels 5,000, tapioca flour 19,000, pepper 8,500, copra 8,000, copra cake 7,500, kapok 3,500 and kapok seed cake 4,500, groundnuts 4,500, agave fibre 4,300.

Owing to the economic depression, native agriculturists were concerned with the production of foodstuffs for home consumption to a greater extent than usual. This has affected the proportion of total exports derived from native holdings in respect of a number of products: in 1932, 24 per cent. of cocoa exports were native-produced; in 1933, only 2 per cent. were derived from this source; 22 per cent. of tea exports in 1932 were from native grown leaf, whereas in the following year this figure fell to 16 per cent. On the other hand, in 1932, 62 per cent. of coffee and 76 per cent. of tobacco exports were native production, whereas in 1933, these exports increased to 69 and 90 per cent. respectively. Exports of pepper, kapok, copra and coconut oil remain almost entirely native production, while sugar and cocoa are now almost entirely estate production. In the aggregate, the percentage of exports of native produce continues to increase; in the year under review 48.8 per cent. of exports were native and 59.2 estate, as compared with 35.8 and 64.2 per cent. respectively in the previous year.

The share of the Netherlands Indies in total world agricultural exports was fully maintained in 1933. The country produced 89 per cent. of the world exports of cinchona, 82 per cent. of the kapok, 80 per cent. of the pepper, 33 per cent. of the rubber, 33 per cent. of the copra and coconut oil, 19 per cent. of the tea and 16 per cent. of the palm oil and kernel.

Cane Sugar.

The area planted with sugar cane decreased from 166,138 hectares in 1932 to 84,343 hectares in 1933. The total crop of estate-grown cane was 11,512,134

World Production of Rubber.
(tons of 2240 lbs.)

	Production.						Percentage of Grand Total.				
	1929	1930	1931	1932	1933		1929	1930	1931	1932	1933
British Malaya	449,600	445,900	434,857	417,137	459,836		51.93	53.92	53.98	57.95	53.07
Netherlands Indies	258,733	240,210	250,511	209,019	283,246		29.88	29.04	31.09	29.04	32.69
Ceylon	80,500	75,500	61,500	49,500	64,000		9.30	9.13	7.63	6.88	7.39
British India	11,720	10,782	8,472	3,896	4,528		1.35	1.30	1.05	0.54	0.52
British North Borneo	7,381	7,115	6,247	5,379	7,555		0.85	0.86	0.78	0.75	0.87
Sarawak	11,313	10,310	10,451	6,960	10,874		1.31	1.25	1.30	0.97	1.25
Siam	2,900	3,900	2,963	2,231	4,859		0.34	0.47	0.37	0.31	0.56
French Indo-China	10,934	10,289	11,714	14,436	17,191		1.26	1.24	1.45	2.00	1.98
Other grower:	5,100	2,100	3,037	2,769	2,641		0.59	0.26	0.38	0.38	0.31
Total of plantation rubber	838,181	806,106	789,752	711,327	854,730		96.81	97.47	98.03	98.82	98.64
Brazil	22,598	17,137	13,320	6,550	9,790		2.61	2.07	1.65	0.91	1.13
Other wild rubber	5,015	3,770	2,575	1,930	2,010		0.58	0.46	0.32	0.27	0.23
Total wild rubber	27,613	20,907	15,895	8,480	11,800		3.19	2.53	1.97	1.18	1.36
GRAND TOTAL	865,794	827,013	805,647	719,807	866,530				100		

metric tons, while 18,566 tons of native-grown cane were purchased by the large estates and milled in the factories. The total factory production of sugar was 1,372,585 metric tons.

Rubber.

The production of rubber in 1933 was 172,202 metric tons from estates and 115,576 metric tons from native holdings, as compared with 150,901 and 61,447 metric tons respectively in 1932. Owing to price improvement, the 1933 exports of native rubber were 88 per cent. greater than in 1932. A number of small re-milling factories were re-opened in the course of the year 1933.

Coffee.

The production of coffee in the Netherlands Indies in the year 1933 amounted to 106,444 metric tons, as compared with 132,673 metric tons in 1932. Of these exports rather more than half was estate production. Of the estate area planted with coffee 93 per cent. is the Robusta type in Java and 89 per cent. in the Outer Provinces.

The Robusta yields per hectare in 1933 were 610 kgs. as compared with 690 kgs. in 1932. Exports were 72,034 metric tons, which is about equal to the average annual exports between 1929 and 1931 but a reduction of 41,765 tons on those of 1932.

Tea.

The planted area increased in 1933; the estate area by 2,140 hectares to a total of 137,844 hectares, the native area by 5,108 hectares to a total of 46,498 hectares. Although the native area continues to increase, the sale of leaf from this source to estates and curing factories continues to decrease. Native tea cultivation is confined to Java. Of the total native area of 46,498 hectares, 43,521 hectares are in bearing.

The production of dry tea from estates was 63,494 metric tons, and from native leaf bought by estates 11,798 metric tons, a total of 75,292 metric tons as compared with 81,937 metric tons in 1932. World exports of tea in 1933 were 385,493 tons of which 71,874 tons (18.65 per cent.) were from the Netherlands Indies.

Tobacco.

The area under cultivation in 1933 was far below normal and production was correspondingly less. The total area under this crop was 129,758 hectares as compared with 141,617 hectares in 1932 and 171,821 hectares in 1931. The total exports in 1933 were 24,918,000 kilograms as compared with 41,188,000 kilograms in 1932 and 45,526,000 kilograms in 1931. The total estate production was 7,848,823 kilograms, of which 5,296,151 kilograms were estate production from native leaf purchased. The quality of the native tobacco is steadily improving, partly due, it is said, to the raising of European tariffs.

Oil Palms.

There are now fifty oil palm estates in the Netherlands Indies with a total area of 72,081 hectares, of which 50,319 hectares are in bearing. Production in 1933 was 22,804,790 kilograms of kernels and 112,153,520 kilograms of oil. As only about 70 per cent. of the planted area is in bearing, further large increases of production are to be expected. The exports in 1933 were 23,100,106 kilograms of kernels and 116,263,614 kilograms of palm oil and palm kernel oil.

Coconuts.

The cultivation of coconuts is predominantly in the hands of small-holders. The total estate area in 1933 was 49,504 hectares, more than half of which is in Celebes and the Moluccas. The area in bearing on estates was 32,537 hectares, which shews that it is still a comparatively new estate crop. Estate production was 29,464 metric tons, including 948 tons bought from natives.

The surplus available for export from native cultivation, after satisfying domestic consumption, can only be calculated by deducting from the copra exports, the figures for imports and for estate exports, all reduced to copra equivalents. For Java this shewed 10,425 metric tons in 1933 as compared with 77,514 metric tons in 1932. The exact extent of native production in Java is unknown. The copra equivalent of the nuts, consumed in local oil mills is estimated at 191,000 metric tons in 1933 as compared with 174,300 metric tons in 1932. Domestic consumption requires 90 per cent. of the output of the local mills, which in 1933 left but 11,596,000 litres of oil for export.

During most of the year, the oil mills paid for nuts prices above parity of copra export quotations, owing to which the export of copra remained small and local consumption of factory oil increased greatly.

An estimate of the Java total production would have to disregard the copra equivalent of the nuts consumed in small native mills and of the nuts used in the fresh state for culinary purposes. With a population of over forty millions, these quantities must be enormous. The Java production in terms of copra in 1933 was 188,600 metric tons as compared with 223,400 metric tons in 1932.

For the Outer Provinces, the export surplus of copra, nuts and oil available after demands of local consumption have been satisfied is known for each region. After deducting estate exports, it amounted to 470,348 metric tons in 1933 as compared with 405,583 metric tons in 1932. These figures include exports to Java and other islands in the Netherlands Indies.

The total exports of coconut products, in terms of copra in 1933 were 502,242 metric tons, the exports in the previous year being 507,656 metric tons. To this total the estate contribution was only 6 per cent.; the situation is therefore entirely dominated by the native produce in excess of the demand for domestic consumption.

Kapok.

Kapok is predominantly a native crop and the cleaning of the fibre from the pods is largely a home industry. There are 131 estates in Java and 31 in the Outer Provinces. These estates also buy and clean native produce.

The exports in 1933 were—in metric tons—fibre 22,643, seeds 17,777, oil 2,423, oil cake 16,447; corresponding figures for 1932 were 19,093, 16,972, 2,167, 11,999.

Pepper.

This crop is almost exclusively grown by natives and Chinese in Sumatra and Borneo. The export surplus in 1933 was 44,189 metric tons, of which 28,493 metric tons were black pepper and 15,696 tons white pepper. Exports in the previous year were 20,242 metric tons of black pepper and 15,932 metric tons of white pepper.

Owing to the low prices prevailing in 1933, upkeep and manuring were greatly neglected and the yield per hectare correspondingly decreased. The large extension of area during the good years 1928 and 1929, however, more than compensated for this decrease in yield per hectare.

Tapioca.

Tapioca is practically confined to Java and is predominantly a native crop. The greater part of the crop is consumed locally. The surplus exported in 1933 included 29,663 metric tons of dried tubers, 17,860 metric tons of dried and ground tubers, 106,807 metric tons of flour (an increase of 18,847 metric tons in 1932), 6,741 metric tons of flakes and siftings and 10,948 metric tons of pearl and seed.

Gambier.

The exports of gambier remained fairly steady in 1933 at 12,812 metric tons, of which 9,444 metric tons were native production. The crop is grown in the Outer Provinces only and Java's large domestic consumption is supplied from this area.

Arecanuts.

Arecanuts are grown only by natives, chiefly in Achin, the East Coast of Sumatra and Java. Exports in 1933 were well maintained at 40,042 metric tons, of which 19,131 metric tons were from Achin, 11,273 metric tons from the East Coast, 6,950 metric tons from Java and 2,688 metric tons from other provinces.

Rice.

The planted area in Java was 3,778,000 hectares, the produce of which is insufficient to satisfy Java's needs. In 1933, Java imported 78,340 tons of rice.

The only islands that regularly produce a surplus for export are Bali and Lombok, and Celebes. The exports from the former are chiefly to Java and those from Celebes to Menado and West Borneo. All the other islands have to import rice from foreign countries. These imports into the Outer Provinces from foreign countries amounted to 260,431 metric tons in 1933.

Maize.

Maize is exclusively a native crop for domestic consumption. In Java three-quarters of the planted area is on dry land and one-quarter on the wet padi lands. The estimated planted area in Java in 1933 was 2,204,000 hectares, producing 2,126,800 tons of maize, of which 78,650 tons were exported. The Outer Provinces exported to Java and foreign countries 32,110 tons in 1933.

Groundnuts.

Exports of groundnuts from the Outer Provinces are small compared with those from Java. The 1933 planted area in Java was 218,000 hectares, producing 160,800 metric tons of decorticated dried nuts of which 37,757 tons were exported. It is to be noted that the export trade has expanded in the past few years; in 1932 it was 32,105 tons, in 1931 18,320 tons, in 1930 18,529 tons and in 1929 26,399 tons.

Sago.

The exports of sago are from the western part of the Archipelago, where the crop is not the chief food supply as it is in the eastern part, notably the Moluccas. The exports in 1933 were 34,014 metric tons, a considerable decrease on the exports of the previous years.

L.A.J.R.

D.H.G.

TWENTIETH REPORT ON NATIVE RUBBER IN THE NETHERLANDS INDIES.*

*Prepared by the Division of Agricultural Economy of the Netherlands Indian
Department of Economic Affairs at Batavia, Java, and dated
26th November, 1934.*

The price of rubber rose slowly during July and August on account of the favourable expectations regarding the results of rubber restriction. In September repercussions followed, since when prices have moved downwards. The average price for Java Standard Sheet in Batavia fell from 23.4 cents per $\frac{1}{2}$ kg. in the second half of August to 19.6 cents in the first half of November. The price of medium blanket amounted on the average to four-fifths that of standard sheet.

The export of native rubber was strongly influenced by the institution and gradual increase of the extra export tax. Furthermore, the raising of the conversion percentages for wet rubber to the dry equivalent influenced exports. In general, the raising of the special export tax was preceded by a large export of rubber in the group concerned. For example, on July 16 a special export tax was instituted for group 1 (dry rubber) amounting to 10 cents per kg. This caused a forced export of rubber during the first half of July, while the raising of the export tax on wet rubber, which came into force on August 1, was responsible for bringing the export of this product to an abnormal height during the second half of July.

The percentage exported as dry rubber ready for the market from the Outer Islands to foreign countries amounted in July to 41.5 per cent. of the total, in August to 44.4 per cent., in September to 34.7 per cent. and in October to 37.0 per cent. This clearly shews the dwindling activities of the reprocessing factories.

The imposition of the special export tax on native rubber resulted in producers and dealers trying to export their wet rubber in a dryer condition, in an effort to evade payment of the full amount of the export tax. For this reason, repeated changes in the conversion percentages were necessary.

The rapid change in the loss by washing of wet rubber points to a modified procedure being used in the preparation of the wet product. In fact, the old method of preparation has virtually been abandoned. The preparation of thin, incompletely dried "cakes" by the use of hand-mangles is already becoming popular, and many such mangles are in use in most of the rubber centres. There is increasing interest in the production of a product that shall be suitable without further handling for the world market. This project is being popularised by an intensive propaganda campaign. Smoked sheet is preferable to unsmoked sheet as the latter is only suitable for direct placing on the world market if it is most carefully prepared and finished. If it is subjected to care-

* Abstract from *Economic Bulletin of the Netherlands Indies*. Vol. II, No. 18, December 1, 1934.

less handling, moulds appear and the sheets must be cured subsequently by smoking. For this reason, propaganda is principally directed towards the production of smoked sheet. To stimulate this movement, certain facilities will be afforded to those interested in the purchase of simple installations, and instruction will be given concerning the preparation, working and distribution of the product.

In the Residency of Banka and its Dependencies and in the free area of the Residency of Riouw and its Dependencies an individual restriction scheme will be started on January 1, 1935, for the native rubber cultivation. A tree census held in these Districts showed that there are 10,937,761 rubber trees on the island of Banka of which 4,681,358 trees are being tapped or have been tapped in the past. On the island of Billiton there are around 700,000 tapped rubber trees.

In the island section of the Residency of Riouw the provisional report states that there are 5,223,216 tappable rubber trees. In this estimate, tappable trees that have never yet been tapped are not included.

For the institution of individual restriction in this area, the number of tappable trees that any one person possessed was used as the basis. The basis quota for 1935 for Banka and its Dependencies has been calculated at 1,355,446 kgs. dry equivalent; that for the Residency of Riouw and its Dependencies at 3,896,936 kgs.

Preparations are in hand for the introduction of individual restriction in the Divisions of Acheen and Tapanoeli.

In Tapanoeli the results of the census in the two most important Sub-Divisions are already known. In the Sub-Division of Padang Sidempoean 23,051,713 trees have been enumerated, of which 11,317,565 are tappable; in the Sub-Division of Sibolga the total number of trees was 9,834,889, of which 5,427,856 are tappable.

In connexion with the study of the possibility of introducing individual restriction in the large rubber producing districts, the Government has recently ordered a general registration of all rubber lands in the Netherlands Indies. It may be assumed that such a registration will meet with very great practical difficulties and will probably consume much time.

Departmental.

FROM THE DISTRICTS.

Compiled by the Chief Field Officer from Monthly Reports submitted by Field Officers.

The Weather.

December, usually one of the wettest months of the year was abnormally dry throughout the Peninsula. Drought conditions prevailed in practically all centres for the first three weeks of the period.

Remarks on Crops.

Rubber.—Prices have remained steady throughout the period under review. It is reported that the extremely dry weather experienced adversely affected yields, and that to fill coupon requirements small-holders resorted to heavy tapping which was frequently performed twice daily.

In Johore 150 to 200 acres of small-holding rubber was severely damaged by fire at Parit Selangor in the Ulu Pontian district, where the work of clearing up lallang grass and secondary jungle growth was in hand. Fires on badly overgrown estates were also reported from the Batu Pahat District.

Except in Pahang East, where mouldy rot disease made its appearance for the first time in sixteen native holdings near Beserah, the incidence of the disease was very considerably reduced by weather conditions unfavourable to its development.

Owing to the low price offered for unsmoked sheet in Kelantan there is a tendency to revert to the manufacture of lump rubber.

Padi.—It is now estimated that the total area of padi destroyed by flood in Kedah earlier in the year amounts to 4,458 acres.

In view of the drought experienced during the month it is considered that a further prolongation of unfavourable conditions will have a serious effect upon yields in the late planted areas of Kedah, Province Wellesley Central, Penang, the coastal mukims of Malacca, the Kuantan District of Pahang, Kelantan, and the riverine mukims of Perak and Krian. In the latter area efforts are being made to maintain the water level till such time as the grain has set.

Harvesting is in full swing in Province Wellesley North, the inland Alor Gajah mukims of Malacca, the riverine mukims of Pahang Central and East, the Jelebu, Kuala Pilah and Seremban Districts of Negri Sembilan and the inland Districts of Selangor, in all of which satisfactory yields are reported.

In the Seremban, Rembau and Tampin Districts of Negri Sembilan, very strong north easterly winds prevailed during the earlier part of the month and

laid large areas of padi, more particularly in the neighbourhood of Bongek where practically the whole crop was blown down.

Transplanting and clearing is in progress in the Panchang Bedina area of Selangor. In the northern areas water is scarce owing to construction work on drains necessitating a lowering of the water level. Dry conditions are retarding the progress of the crop and have given rise to a certain amount of damage by mole crickets. The southern portion of the area is adequately supplied with water, and transplanting is well in hand.

Most of the producing areas in the coastal belt of Malacca were visited for the purpose of revising information regarding irrigation facilities and possible improvements for the information of the Drainage and Irrigation Department.

Coconuts and Copra.—The price of copra appreciated during the month, while nut values rose considerably, due partly to the keen competition for fresh nuts between copra manufacturers, but mainly to the incidence of the fasting month, and the approach of Hari Raya Puasa. Copra produced on improved types of small-holding kilns continues to receive satisfactory prices, and the further extension of kilns of this type is being made in most centres of production.

Importation of fresh nuts in large quantities continues to be made from Kuantan, Kelantan and Temerloh to Lipis, and at times from Kuala Lumpur to Raub.

The manufacture of copra in the coastal Districts of Selangor has further declined. Owing to requirements during the fasting month, a brisk demand has existed for fresh nuts throughout the State which has been met from producing centres. An increase in the manufacture of oil has been reported from the Kuala Langat District.

Tobacco.—Areas damaged during the recent floods in the Baling District of Kedah are being planted. Owing to a shortage of leaf, prices have risen to \$40 to \$45 per picul. A substantial increase in prices for all grades is also recorded from Perak in view of a limited supply.

Fruit.—Light but sporadic harvests of the common kampong fruits such as durian, duku, rambutan, langsung and machang are reported from all States.

Cloves.—The crop in Penang Island is now in full bearing and harvesting is in progress. Dried cloves are being sold to dealers at \$38 per picul.

Pineapples.—In Johore and Singapore supplies continue to be limited and factories are only working intermittently. The season is late, but with the dryer and warmer weather conditions now prevailing, ripening should be hastened and supplies become more plentiful during the coming month. Prices for fruit continue to be high and range from cents 55 to \$3 per 100 depending upon quality.

With the maturing of young rubber, many holdings in Johore carrying pineapples as a catch crop are being cleared of the plants.

A recent innovation in one Singapore factory is the canning of pineapple cores for export to Canada. The cores are packed in 8 lb. tins and are quoted at \$3.75 per case.

A heavy crop of fruit in the Klang District of Selangor is now becoming available for the local factory.

Tuba.—The demand for planting material of this crop from Singapore continues to be maintained. This is more particularly the case in relation to cuttings from the Changi District.

Agricultural Stations.

Unfavourable weather conditions limited planting operations on all stations. General upkeep has been well maintained, and a satisfactory quantity of planting material distributed to small holding cultivators.

At the Tanah Rata Station, Cameron Highlands, 8,305 pounds of green leaf yielded 1,555 pounds of made tea during the month. The mature fields have again shown a falling off in yield which is now regarded as seasonal. Extensive alterations to the factory plant are at present in hand to cope efficiently with an increased crop and reduce manufacturing costs.

Poultry flocks maintained on Stations continue to make satisfactory progress, and afford useful information for a further study of local requirements. Recent importations of pure bred Rhode Island Red birds from Australia for Negri Sembilan and Pahang, arrived in good condition and settled down well. A commencement has been made to re-establish a flock at Kuala Kangsar, and runs and accommodation are also under construction at Selama, Perak.

Garden Competitions.

In Malacca, Negri Sembilan and Johore the judging of school gardens in the annual competition was carried out during the month. The standard in Malacca, although high was not considered to be as good as the preceding year. In Negri Sembilan the outstanding feature was the high standard maintained by some of the more remotely situated schools, while in Johore, although entries were limited, the general standard was good.

Kampong and Home Garden Competitions were judged in Pahang Central and South. Results in Pahang Central were considered to be much better than last year, many gardens being reported to be not only a credit, but of considerable value to the owners. Entries in the Kampong Garden Competition in Pahang South were not encouraging, but a good standard was achieved. Home gardens, however, were well represented and attained a satisfactory standard.

In the Sawah Competition organised in Negri Sembilan only twenty-six sawahs were eligible to compete, owing to disqualification for failure to adhere to the programme of planting dates. The condition of the majority of the sawahs confirmed the opinion previously formed that the inducement of a small

cash prize had a very considerable effect in the improvement of upkeep and management of competing areas.

Temerloh Rice Mill.

The installation of machinery has been completed, and a trial run was carried out during the month. It was found that further adjustments were necessary before the plant could be put into operation. The buying of padi for the mill requirements has commenced, and with the completion of harvest now in hand ample stocks are anticipated.

Poultry Diseases.

An unidentified disease occurred at Gunong in Kelantan during the wet weather towards the end of November. Preventive measures were recommended but the attack rapidly diminished with the advent of dry weather.

An outbreak thought to be caused by diptheretic-stomato-pharyngitis was reported from Gunong Semanggol in Krian, Perak. The infection was confined to one flock of which practically 50 per cent. succumbed.

DEPARTMENTAL NOTES.

Tour of Adviser on Agriculture.

The Acting Adviser on Agriculture, Malay States, visited Temerloh, Pahang, on December 7th and 8th 1934, for the purpose of inspecting the new Government Rice Mill which was nearly ready for a trial run. Provisional arrangements for the supervision and running of the mill were discussed with the Hon'ble the British Resident, Pahang, the District Officer, Temerloh, the Executive Engineer, Temerloh and the State Agricultural Officer, Pahang.

On 8th December the Acting Adviser inspected the Agricultural Station and Padi Test Plot, Temerloh.

Market for *Derris* Root.

The cultivation of *Derris* spp. has received considerable attention during the past year, and the exports of the dried root have increased. Enquiries regarding the purchase of this product have been received by the Department of Agriculture, and it is possible that a market can be found for further supplies.

Planters who have root for sale, or who contemplate the development of land for the cultivation of this crop, are advised to communicate with this Department as introductions may be effected to arrange forward sales or contracts with purchasers.

Leave.

Mr. F. R. Mason, Agricultural Field Officer, returned from leave on 29th December, 1934. He has assumed the duties of State Agricultural Officer, Selangor.

Statistical.

MARKET PRICES.

December 1934.

Rubber.—There was little variation in the price of rubber during December. Spot loose opened in Singapore at 21 $\frac{3}{4}$ cents per lb. and closed at 20 $\frac{3}{4}$ cents, the average for the month for Smoked Sheet equal to London Standard being 20.75 cents per lb. as compared with 20.93 cents per lb. in November. The average price in London for December was 6.30 pence per lb. and in New York 12.86 cents gold per lb. as compared with 6.29 pence and 12.91 cents gold respectively in November.

The following table shews weekly prices paid during the month for small-holders' rubber at three centres.

Table 1.
Weekly Prices Paid By Local Dealers for
Small-Holders' Rubber, December, 1934.
(Dollars per Picul.)

Grades.	Kuala Pilah, Negri Sembilan.				Kuala Kangsar, Perak.				Batu Pahat, Johore.			
	6	13	20	27	5	12	19	26	5	12	19	26
Smoked sheet	24.00	24.63	23.09	22.87	24.03	23.89	23.42	23.00			22.49	
Unsmoked sheet	21.53	21.71	22.31	21.06	21.01	20.82	20.73	20.41	20.00	20.05		19.00
Scrap		14.08	13.85	14.00								10.45

Transport by lorry Kuala Pilah to Seremban 15 cents per picul, to Malacca excluding duty, 25 cents per picul, by rail Seremban to Penang \$1.24 per picul, Seremban to Singapore \$8.00 per ton.

Transport from Batu Pahat to Singapore by lorry excluding duty, 90 cents per picul.

Transport from Kuala Kangsar to Prai by railway \$6.20 per ton.

Transport from Kuala Kangsar to Singapore by railway \$10.00 per ton (minimum consignment 5 tons).

At Kuala Pilah the standard deduction for moisture in unsmoked sheet is 5 per cent.

At Kuala Kangsar the standard deduction for moisture in unsmoked sheet is 10 per cent.

Palm Oil.—The following prices for the local commodity were quoted during the month, and show the upward trend of the market.

Table II.

Prices of Palm Oil and Palm Kernels.

Date 1934.	Palm Oil in Bulk, c.i.f. landed weight Liverpool/ Halifax.	Palm Kernels, c.i.f. landed weight London/ Continent
	per ton	per ton
Nov 30	£15. 0. 0	£ 6. 12. 6
Dec. 7	15.10.0	7. 2. 6
„ 14	16. 0. 0	7. 0. 0
„ 21	16. 0. 0	6. 15. 0
„ 28	16. 0. 0	6. 17. 6

Copra.—A marked improvement in the Singapore market was evidenced during December, a strong upward tendency being maintained except for a slight weakening in the middle of the month. The sun-dried grade opened at \$3.05 per picul and closed on a still rising market at \$3.30, averaging \$3.16 per picul for the month, as compared with \$2.95 in November. The mixed quality continued to maintain its high value in comparison with the sun-dried grade and averaged \$2.91 for the month as compared with \$2.70 in November.

Copra cake remained unchanged throughout the month at \$1.70 per picul.

Rice.—The average wholesale prices of rice per picul in Singapore during November were as follows:—Siam No. 2 (ordinary) \$2.96, Rangoon No. 1 \$2.85, Saigon No. 1 (long grain) \$2.92, as compared with \$3.14, \$3.15 and \$3.05 in October. Corresponding prices in November 1933 were \$3.31, \$3.10 and \$2.85 respectively.

The average retail market prices in cents per gantang of No. 2 Siam rice in November were:—Singapore 24, Penang 25, Malacca 24, as compared with 26, 25 and 24 respectively in October.

The average declared trade value of imports of rice in November was \$3.25 per picul as compared with \$3.36 in October and \$3.38 in September.

Padi.—The Government Rice Mill, Bagan Serai continued to pay \$1.50 per picul for padi and the privately-owned mill maintained its lower price of \$1.30 per picul. Prices per gantang ranged from 5 cents to 12 cents in different parts of the country.

Tea.—Boh Plantations tea was quoted for the first time on the London market in November, the price being 11d. per lb. Kedah tea was quoted at 11d. and 10½d. per lb. during the month.

Average London prices per lb. during November for tea consignments from other countries were as follows:—Ceylon 1s. 1.98d., Java 10.44d., Indian Northern 1s. 0.05d., Indian Southern 11.50d., Sumatra 9.33d. Prices still continued to weaken.

Tuba Root (Derris).—The Singapore market was quiet during December. Prices remained unchanged for roots sold on rotenone content, good quality averaging \$44 per picul and fair qualities averaging \$40 per picul. Roots sold on a basis of ether extract averaged \$30 per picul, an increase of \$1 per picul as compared with November.

Coffee.—Singapore prices of coffee improved slightly during December but weakened again at the close of the month. Sourabaya coffee opened at \$19.50 to \$20 per picul, rose to \$20 to \$21, and closed at \$19.50 to \$20.50. Palembang coffee opened at \$13.25 per picul, falling to \$12.75, an average of \$13 for the month as compared with \$12.94 in November.

Local prices for coffee again appreciated slightly, ranging from \$18 to \$32 per picul in different Districts according to quality.

Arecanuts.—Average prices per picul in Singapore for December were as follows:—Splits \$4.62 to \$5.50, Sliced \$7.62 to \$8.62, Red Whole \$5.06 to \$6, the price in each range depending upon quality.

The average prices per picul quoted by the Singapore Chamber of Commerce were:—Best \$6.08, Medium \$5.68, Mixed \$5.10.

Gambier.—The price of Block in Singapore weakened during December to close at \$5.75 per picul, an average for the month of \$6.15, but No. 1 Cube appreciated considerably, closing at \$12 per picul, an average of \$11.60. The November average prices were \$6.75 and \$9.50 respectively.

Pineapples.—Prices in Singapore improved slightly during the month. Average prices per case were:—Cubes \$3.07, Sliced Flat \$2.95, Sliced Tall \$3.32. Average prices in November were \$3, \$2.85, and \$3.25 respectively.

Local average prices of fresh fruit per 100 were:—Singapore, \$2.50 for large fruits, and \$1.50 for small fruits; Johore, 1st quality \$2.50 to \$3, 2nd quality \$1.90 to \$2.20, 3rd quality 55 cents to \$1.70; Selangor, 70 cents to \$4 according to quality, \$4 to \$12 for Sarawak pines.

Tapioca.—There was no change in the Singapore market during the month, prices continuing at the November level:—Flake Fair \$3.50 per picul, Seed Pearl \$5.50 and Pearl Medium \$5.85.

Sago.—The price of Pearl, Small Fair in Singapore remained unchanged during December at \$3.70 per picul, but Flour, Sarawak Fair improved slightly to average \$2.31 per picul. November average prices were \$3.72 and \$2.16 respectively.

Mace.—The Singapore market continued unchanged throughout the month at the November quotations of Siouw \$90 and Amboina \$60 per picul.

Nutmegs.—The Singapore market weakened slightly during December, average prices per picul being : 110's \$25.60 and 80's \$26.20, as compared with \$26 and \$27 respectively for the previous month.

Pepper.—Further heavy buying in London again raised prices, Singapore White closing at \$65 per picul and Muntok White at \$67, but Singapore Black weakened on poor demand. Average prices per picul in Singapore during December, were :—Singapore Black \$20.60, Singapore White \$63.60, Muntok White \$65.60, as compared with \$21.25, \$62.25 and \$64.25 respectively in November.

Cloves.—Prices continued nominal in Singapore at Zanzibar \$35 and Amboina \$45 per picul.

Tobacco.—Local prices varied considerably according to quality. In Perak a substantial rise in values was reported due to increased demand by local manufacturers; prices per picul quoted were :—1st quality \$60, 2nd quality \$50, 3rd quality \$43. In Kelantan prices ranged from \$45 to \$70 per picul, while elsewhere the range was from \$20 to \$48.

The above prices are based on London and Singapore daily quotations for rubber; on the Singapore Chamber of Commerce Weekly Reports for the month and on other local sources of information. Palm oil reports are kindly supplied by Messrs. Guthrie & Co. Ltd., Kuala Lumpur; the Singapore prices for coffee and arecanuts by the Lianqui Trading Company of Singapore, and tuba prices by Messrs. Mackay & Co., Singapore.

1 picul = 133½ lbs. The Dollar is fixed at two shillings and four pence.

Note.—The Department of Agriculture will be pleased to assist planters in finding a market for agricultural produce. Similar assistance is also offered by the Malayan Information Agency, 57, Charing Cross, London, S.W.1.



GENERAL RICE SUMMARY*

November, 1934.

Malaya.—Imports during November of foreign rice into Malaya were 46,237 tons and exports 18,197 tons; net imports accordingly were 28,040 tons. Net imports for the period January to November, 1934, totalled 413,344 tons, an increase of 4.5 per cent.†

Of the imports during November, 46 per cent. were consigned to Singapore, 15 per cent. to Penang, 5 per cent. to Malacca, 21 per cent. to the Federated Malay States and 13 per cent. to the Unfederated Malay States. Of the total, 74 per cent. came from Siam, 23 per cent. from Burma, 2 per cent. from French Indo-China and 1 per cent. from other countries.

Of the exports during November, 73 per cent. were shipped to the Netherlands Indies and 27 per cent. to other countries. The various kinds of rice exported were:—Siam 12,065 tons (66.3 per cent.), Burma 4,144 tons (22.8 per cent.), French Indo-China 194 tons (1.1 per cent.), local production 112 tons (0.6 per cent.).

India and Burma.—For the period January to October 1934, foreign exports totalled 1,256,000 tons, a decrease of 24.1 per cent as compared with 1,655,000 tons in 1933.

Total exports of rice and bran from Burma for the period 1st January to 3rd November 1934 were 3,426,348 metric tons, against 2,980,332 metric tons in 1933, an increase of 15 per cent.

It is estimated that for the season 1934-35 the area likely to mature in Burma will be 12,393,200 acres, a decrease of 0.6 per cent. as compared with the final figures for the season 1933-34.

Siam.—Exports of rice from Bangkok during October 1934 were 187,570 tons, making a total of 1,532,681 tons for the period January to October 1934, as compared with 1,358,583 tons in 1933.

Japan.—According to the *Trans-Pacific Journal*, 22nd November 1934, the final estimates of the 1934-35 crop of Japan Proper amount to 7,117,270 tons, a decrease of 28.4 per cent. as compared with the actual crop of the previous season, and the lowest crop since 1913.

French Indo-China.—Entries of padi into Cholon for the period 1st January to 30th November, 1934, totalled 1,471,113 metric tons as compared with 1,034,261 metric tons in 1933, an increase of 42.2 per cent.

Exports of rice for the same period were 1,429,515 metric tons against 1,161,557 metric tons in 1933, an increase of 23.1 per cent.

According to the report of the Saigon Rice Market for November 1934, the market was lively during the first half of the month as the result of im-

*Abridged from the Rice Summary for November, 1934, compiled by the Department of Statistics, Straits Settlements and Federated Malay States.

† It is to be understood throughout the summary that all comparisons and percentage increases or decreases are in relation to the corresponding period of 1933.

portant demands from Shanghai which caused a rise in prices. Less activity was apparent during the second half of the month and prices fell as compared with those of the first fortnight.

Netherlands Indies.—No information is available subsequent to the October summary.

Ceylon.—Imports for the period January to November 1934, totalled 432,253 tons as compared with 398,996 tons in 1933, an increase of 8.3 per cent.

Of the 1934 imports, 13.8 per cent. were from British India, 61.8 per cent. from Burma, and 24.4 per cent. from other countries.

Europe and America.—Shipments to Europe from the East for the period 1st January to 22nd November, 1934, totalled 1,130,222 tons, a decrease of 5.9 per cent. as compared with 1,201,399 tons in 1933.

Of the 1934 shipments, 34 per cent. were from Burma, 4 per cent. from Japan, 50 per cent. from Saigon, 10 per cent. from Siam and 2 per cent. from Bengal. The 1933 percentages were 47, 2, 43, 7 and 1 respectively.

Shipments from the East to the Levant for the period 1st January to 12th October, 1934, were 26,589 tons, an increase of 13.7 per cent. as compared with 23,389 tons in 1933.

Shipments to the West Indies and America from 1st January to 3rd November, 1934, totalled 166,660 tons as against 141,487 tons in 1933, an increase of 17.8 per cent.

MALAYAN AGRICULTURAL EXPORTS, NOVEMBER, 1934.

PRODUCT.	Net Export in Tons.				
	Year 1933.	Jan.-Nov. 1933.	Jan.-Nov. 1934.	November 1933.	November 1934.
Arecanuts ...	20,756	20,086	17,322	2,353	1,936
Coconuts, fresh † ...	100,609†	94,102†	89,787†	7,701†	5,499†
Coconut oil ...	17,568	16,149	23,138	1,436	2,440
Copra ...	110,543	96,966	86,693	10,201	10,066
Gambier, all kinds ...	2,560	2,294	2,026	267	199
Oil cakes ...	9,992	9,089	10,597	716	820
Palm kernels ...	1,983	1,813	2,771	100	147
Palm oil ...	12,101	10,466	15,055	1,219	1,873
Pineapples canned ...	59,582	54,340	61,793	3,069	2,563
Rubber ¶ ...	459,836¶	414,631¶	426,871¶	41,843¶	39,591¶
Sago,—flour ...	7,648	6,034	8,559	2,247	1,928
" —pearl ...	2,646	2,277	4,494	360	410
" —raw ...	4,420*	3,917*	6,326*	435*	800*
Tapioca,—flake ...	9,881	9,185	5,592	494	454
" —flour ...	702*	370*	1,786*	188*	130*
" —pearl ...	17,297	16,247	14,345	1,679	1,099
Tuba root ...	569‡	498	462	62	15

† hundreds in number.

* net imports.

¶ production.

MALAYA RUBBER STATISTICS

ACRES OF TAPPALE RUBBER NOT TAPPED ON ESTATES OF 100 ACRES AND OVER, FOR THE MONTH ENDING 30TH NOVEMBER, 1934.

STATE OR TERRITORY	Acres of Tappable Rubber end 1933 (d)	ESTATES WHICH HAVE ENTIRELY CEASED TAPPING		ESTATES WHICH HAVE PARTLY CEASED TAPPING (a)		AREA OF TAPPALE RUBBER NEVER BEEN TAPPED			Total (3) + (5) (9)	Percentage of (9) to (2) (10)
		Acres (3)	Percentage of (3) to (2) (4)	Acres (5)	Percentage of (5) to (2) (6)	Acres (7)	Percentage of (7) to (2) (8)			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	
STRAITS SETTLEMENTS :—										
Province Wellesley	44,285	1,128	2.5	7,391	16.7	567	1.3	8,519	19.2	
Dindings	7,368	112	1.5	931	12.6	97	1.3	1,043	14.1	
Malacca	121,152	371	0.3	14,899	12.3	2,430	2.0	15,270	12.6	
Penang Island	1,366	126	9.2	297	21.7	114	8.3	423	30.9	
Singapore Island	28,842	2,902	10.0	4,905	17.0	557	1.9	7,807	27.0	
Total S.S.	203,013	4,639	2.3	28,423	14.0	3,765	1.8	33,062	16.3	
FEDERATED MALAY STATES :—										
Perak	253,227	2,736	1.0	32,854	13.0	12,902	5.1	35,590	14.0	
Selangor	310,003	3,719	1.2	36,555	11.8	11,216	3.6	40,274	13.0	
Negri Sembilan	233,592	5,203	2.2	29,643	12.7	16,797	7.2	34,846	14.9	
Pahang	46,712	3,939	8.4	15,687	33.6	10,047	21.5	19,626	42.0	
Total F.M.S.	843,534	15,597	1.8	114,739	13.6	51,052	6.0	130,336	15.4	
UNFEDERATED MALAY STATES :—										
Johore	365,400	9,108	2.5	22,475	6.1	19,424	5.3	31,383	8.6	
Kedah (b)	126,888	1,798	1.4	28,886	22.8	19,591	15.5	30,684	24.2	
Kelantan	25,793	8,641	33.5	2,555	9.9	5,418	21.0	11,196	43.4	
Trengganu (b)	4,543	Nil	Nil	98	2.2	98	2.2	98	2.2	
Perlis (c)	1,181	Nil	Nil	266	22.5	266	22.5	266	22.5	
Total U.M.S.	523,505	19,547	3.7	54,280	10.4	44,797	8.6	73,827	14.1	
Total MALAYA	1,570,052	39,783	2.5	197,442	12.6	99,614	6.3	237,225	15.1	

Notes :—(a) Area out of tapping on Estates which have partly ceased tapping refers to areas definitely being rested and excludes areas on any tapping round.

(b) Registered Companies only.

(c) Rendered quarterly.

(d) Figures are as reported by estate managers.

MALAYA RUBBER STATISTICS TABLE 1
AND EXPORTS OF RUBBER, INCLUDING LATEX, CONCENTRATED LATEX,
FOR THE MONTH OF NOVEMBER, 1934, IN DRY TONS.

State or Territory	Stocks at beginning of month 1		Production 1/2 during the month		Procurement by Esates of less than 100 acres estimated 2		Imports				Exports including re-exports				Stocks at end of month		
	Ports	Dealer	Esates of 100 acres and over	January to the month inclusive 1934	January to the month inclusive 1934	January to the month inclusive 1934	during the month		January to Nov inclusive 1934		during the month		January to Nov inclusive 1934		Ports	Dealers	
							Foreign	From Malay States & Lanchin	Foreign	From Malay States & Lanchin	Foreign	Local	Foreign	Local			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
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TABLE II
DEALERS' STOCKS, IN DRY TONS

Class of Rubber	Federated Malay States	S. Jore	Penang	Provinc. Districts	Labore	Kedah
20	10,173	34,394	8,727	4,767	1,919	252
DRY RUBBER	1,613	4,264	1,907	325	1,066	210
WET RUBBER	11,786	38,658	10,634	4,992	2,985	462
TOTAL	21,859	73,052	20,261	5,322	4,004	662

TABLE III
FOREIGN EXPORTS

PORTS	For month	January to Oct. 1934
Singapore	33,641	412,389
Penang	...	11,259
Port Swettenham.	...	136,976
Malacca	5,771	62,299
...	459	6,122
MALAYA	51,140	67,786

TABLE IV
DOMESTIC EXPORTS

AREA	For month	January to Oct.
30	31	1934 32
Malay States ...	32,974	431,718
Straits Settlements	4,228	
MALAYA	37,202	431,716

Notes:— 1. Stocks on estates of less than 100 acres and stocks in transit on rail, road or local steamer are not ascertained.

The production of estates of less than 100 acres is estimated from the formula: $\text{Exports} + \text{Stocks at end of month} + \text{Consumption, } t_n, \text{ Columns [15] + [16] + [19] + [20] + [21] + [22] - [4] - [5] - [6] - [7] - [11] - [12]}$. For the Straits Settlements, Column [9] = figures for Singapore and Penang Islands represent sales of exports as shown by cess paid and for the mainland represent as previously purchases by dealers from local estates of less than 100 acres, reduced by 15 % to terms of dry rubber.

3. Dealers' stocks in the Federated Malay States are reduced to dry weights by the following fixed ratios: unsmoked sheet, 15% wet sheet, 25% scrap, lump, etc., 40%; stocks elsewhere are in dry weights as reported by the dealers themselves.

4. Column (3) represents domestic exports in dry weights as reported by the dealers themselves, plus production as represented by sales or exports in the Islands of Singapore and Penang. Column (4) includes imports from the mainland (Labuan and Brunel), plus production as represented by sales or exports in the Islands of Singapore and Penang. Column (5) includes domestic exports, plus production as represented by sales or exports. Column (6) includes domestic exports of the Straits Settlements for the period January to May inclusive. Column (3) includes from June to August 1938, 1939, 1940, 1941, 1942, 1943, 1944, 1945, 1946, 1947, 1948, 1949, 1950, 1951, 1952, 1953, 1954, 1955, 1956, 1957, 1958, 1959, 1960, 1961, 1962, 1963, 1964, 1965, 1966, 1967, 1968, 1969, 1970, 1971, 1972, 1973, 1974, 1975, 1976, 1977, 1978, 1979, 1980, 1981, 1982, 1983, 1984, 1985, 1986, 1987, 1988, 1989, 1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600,

5. The above, with certain omissions, is the Report published by the Registrar - General of Statistics, S.S. and F.M.S., at Singapore on 28 December.

LOCALITY.	AIR TEMPERATURE IN DEGREES FAHRENHEIT					EARTH TEMPERATURE		RAINFALL					BRIGHT SUNSHINE.						
	Means of		Mean of A and B.	Absolute Extremes				At 1 foot	At 4 feet	Total.		Most in a day.	Number of days.			Total.	Daily Mean.	Per cent.	
	A.	B.		Max.	Min.	Hightest.	Lowest.			Hightest.	Lowest.		Precipitation, in. or more.	Thunder-storm.	Fog morning obs.				Gale force 8 or more.
		°F	°F	°F	°F	°F	°F	°F	°F	°F	in.	mm.	in.				Hrs.	Hrs.	
Railway Hill, Kuala Lumpur, Selangor	89.6	71.9	80.7	94	70	83	74	83.5	84.3	16.31	414.3	3.63	25	20	5	7	115.40	3.85	32
Bukit Jeram, Selangor	86.4	71.6	79.0	89	69	82	73	82.3	83.8	10.17	258.3	1.98	22	18			168.60	5.62	47
Sitiawan, Perak	87.5	72.6	80.1	91	71	81	75	83.1	84.7	14.12	358.7	2.96	24	19			166.05	5.53	46
Temerloh, Pahang	86.8	72.4	79.6	90	70	78	75	83.2	85.2	10.48	266.2	1.87	22	16	3	9	141.90	4.73	39
Kuala Lipis, Pahang	86.5	70.9	78.7	89	69	78	73	82.5	83.9	13.29	337.6	2.63	20	16		27	144.10	4.80	40
Kuala Pahang, Pahang	83.7	73.3	78.5	87	71	77	76	81.8	84.0	13.29	337.6	2.75	24	19	1		138.95	4.63	39
Kallang Aerodrome, Spore	85.6	74.2	79.9	89	72	78	76	80.2	82.2	12.47	316.7	3.28	24	22	4		127.60	4.25	35
Butterworth, Province Wellesley	85.6	73.4	79.5	89	71	79	76	83.2	84.1	15.05	382.3	2.52	22	20	2		169.80	5.66	47
Bukit China, Malacca	83.8	73.2	78.5	87	72	81	76	81.2	82.6	9.75	247.7	1.80	24	19	2		138.30	4.61	38
Kluang, Johore	86.5	70.9	78.7	91	69	79	73	81.4	82.3	5.94	150.9	1.37	22	20		9	114.60	3.82	32
Bukit Lalang, Mersing, Johore	83.9	71.8	77.9	90	69	77	73	80.3	81.0	10.43	264.9	1.47	26	21	1	3	120.30	4.01	33
Alor Star, Kedah	86.2	73.0	79.6	91	69	79	75	84.2	85.0	6.89	175.0	1.60	18	13	3		158.30	5.28	44
Kota Bharu, Kelantan	83.9	72.8	78.3	87	69	76	75	81.8	83.9	28.57	725.7	5.74	17	17		1	146.00	4.87	41
Kuala Trengganu, Trengganu HILL STATIONS.	84.0	72.2	78.1	87	70	75	75	80.7	82.4	14.63	371.6	3.35	22	19			154.00	5.13	43
Fraser's Hill, Pahang 4268 ft.	72.0	61.2	66.6	76	59	66	63	70.8	71.6	13.13	333.5	2.31	22	22	3	8	103.75	3.46	29
Pahang Highlands, Tanah Rata, Pahang 4750 ft.	71.0	56.7	63.9	75	50	64	62	69.5	69.7	14.19	360.4	2.30	25	22		1	98.40	3.28	27
Cameron Highlands, Rhododendron Hill, Pahang 5120 ft.	69.6	58.3	63.9	74	56	63	60			14.22	361.2	2.67	25	24			105.35	3.51	29

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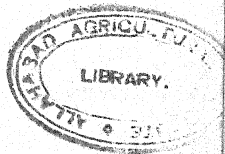
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EDITORIAL.

Internal Economy in the Palm Oil Factory.

The maximum recovery of high quality palm oil and palm kernels is the chief objective of the palm oil factory. It is only when the factory has been in operation for some time that the necessity for economy of fuel becomes apparent. By this time the supply of residual jungle-timber in the vicinity of the factory will have become exhausted and supplies will become more expensive as they are collected at increasing distances from the factory.

With efficient management, the bulk of the fuel for the factory is supplied by the nut-shells and the pericarp residue, the former being the more important constituent. The authors of an article in this number discuss this subject under the title "Fuel Economy in the Palm Oil Factory". They shew that although these waste materials are not efficient fuels, under certain conditions they can be made the main source of supply.

To obtain the maximum value of the fuel the material should be adequately dried. Further economies are possible in the hands of an efficient furnace attendant. Attention is also drawn to the fact that additional economies are possible by the utilization of exhaust steam and by adequate heat insulation.

In view of the narrow margin now existing between cost of production and selling price of the oil and kernels, increased attention to possible economies in production are of great importance. The article mentioned above discusses this question and supplies data concerning boiler efficiency and the calorific value of the fuels usually employed in palm oil factories.

The cultivation of mushrooms has been discussed in various numbers of this Journal. Descriptions have been given of the cultural methods employed successfully in Province Wellesley and Penang. Subsequent attempts to repeat these methods in various parts of the country have been unsuccessful. It is evident, from

the short article on another page, which records the development of these mushrooms in Kedah without cultivation, that, given the proper conditions, this variety of mushroom is suitable for cultivation in Malaya. It is equally evident that the ideal conditions are as yet imperfectly understood.

The Department of Agriculture is making a close study of this problem, and it is hoped that the results of these investigations will place growers in possession of more exact knowledge of the climatic and other requirements for the cultivation of this edible fungus.

Original Articles.

FUEL ECONOMY IN THE PALM OIL FACTORY

BY

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and

T. A. BUCKLEY,
Assistant Chemist.



Introductory.

Although the principal aim of the palm oil factory manager is the maximum recovery of high quality palm oil and palm kernels, the economical raising of the necessary steam supply for the factory should not be neglected.

In the early stages of working the factory, the question of fuel consumption is apt to be overlooked, principally on account of absence of any direct return as a result of effecting economies in this direction. Fuel is plentiful, since in addition to nut-shells and pericarp residue, invariably there is residual jungle timber in the vicinity of the factory.

As time passes and timber must be collected at increasing distances from the factory, the question of making the estate factory more nearly self-supporting as regards supplies of fuel becomes of much greater importance.

Although it is not suggested that this state of affairs is yet typical of palm oil factory practice in Malaya, it serves to emphasize the importance of the conservation of fuel and steam supplies in the factory, while drawing attention to the combined objective of the factory manager—the maximum recovery of high quality products under the most economical conditions.

Attention has been given to this question in the palm oil factory at the Central Experiment Station, Serdang, and the present article summarises the results of experiments made to test the efficiency of steam-raising there. A description of the plant installed at Serdang has already been published.*

The economical supply of steam in a factory falls under three headings: fuel efficiency, boiler efficiency, and efficient use of the steam which has been generated.

Factories, in general, select the most economical and efficient fuel available, but when they have a waste product which is combustible it is usually burnt under boilers although itself of low efficiency or heat value. As palm oil factories burn mainly waste products, and in Malaya the supplementary fuel is inevitably wood, factory managers may be said to have no choice of fuel, and thus the question of fuel efficiency becomes rather academic. Nevertheless, it is necessary to estimate the efficiency of the fuel in use before a calculation of boiler efficiency can be made.

* *Malayan Agricultural Journal*, Vol. XIX, No. 8, August 1931, page 384.

The efficiency in the use of steam could not be numerically estimated at Serdang as no adequate alternative motive power was available. It is only possible to indicate some of the precautions which make for conservation of steam. Steam lines should be as short as is consistent with a sufficiently spacious lay-out of the factory and should be well lagged to minimise loss of heat. Exhaust steam should be used to heat the boiler feed water, and closed steam coils should be provided with steam traps which do not allow steam to escape but only the condensed hot water which also joins the boiler feed.

Actually, at Serdang the distribution and utilisation of steam is not very good. In particular, the steam engine is too far from the boiler and the steam pipe is too narrow so that the pressure of steam delivered to the engine falls short of that registered at the boiler. The reason for the apparent bad placing of the engine is that it is also required to supply power to an adjacent factory.

The steam engine at Serdang is designed to work at high pressure. The boiler pressure of 140 lbs. is not really high enough for its efficient working, although this is far greater than is required for other purposes in the factory. Estate factories commonly employ boilers raising steam at 60 to 80 lbs., with engines working at correspondingly low pressure. It should be mentioned that, theoretically, from thermodynamic principles, the possible efficiency of an engine increases as the range of temperature between inlet and exhaust increases, and that high efficiency in steam-power production demands high boiler pressures. Nevertheless, where a large amount of low pressure steam is required, as in a palm oil factory, a low pressure engine is a suitable equipment.

Nature of Fuel Available.

Although any of the solid waste products from the factory may be used as fuel, the two most important are the nut-shells and the pericarp residue. The possibilities of using the residual fruit bunches from the threshing-machine should not, however, be disregarded.

The nut-shells constitute a more important fuel supply than the pericarp residue, the output of shells being much greater, while in addition they are easily handled and do not burn away so readily as the light fibrous pericarp residue. Calculations show that, for fruit containing 10 per cent. by weight of bunch trash, the proportions of waste products on an air-dry basis are approximately 27 per cent. by weight of nut shells to 15 per cent. by weight of pericarp residue; that is, the amount of nut-shells is nearly double that of the pericarp residue.

Preliminary chopping of the bunch residue into two or more pieces, followed by air-drying is essential to facilitate handling and to reduce the moisture content, which may amount to as much as 65 per cent. by weight of the fresh material.

An essential factor in the calculation of the efficiency of the boiler is the determination of the heating or calorific values of the materials used as fuel,

The calorific value of a fuel may be defined as the number of heat units liberated by the complete combustion of unit weight of the material. In this case weights will be expressed in pounds, and the calorific values as British Thermal Units (B.T.U.)†.

The following table, Table I, shows the gross calorific values as determined in a calorimeter, of various oil palm products, including palm oil, palm kernels and palm kernel oil. The last three products are included merely for reference purposes.

Timber has also been included in the table, as most oil palm estates find it necessary to use timber to supplement the fuel supply of the factory.

Table I.

Gross Calorific Values of Oil Palm Products and Timber.

(Values are given to the nearest 10 units)

Product	Moisture Content	Calorific Value.	Estimated Calorific Value (Moisture-free basis)
	per cent.	B.T. Units	B.T. Units
Bunch residue ...	15.6	6,910	8,190
Residue from stripped fruit ...	12.1	7,010	7,980
Pericarp residue (Oil content 17 per cent. moisture-free basis) ...	13.4	8,190	9,460
Nut-shells ...	12.1	7,950	9,040
Palm oil ...	...	17,580	17,580
Palm kernels ...	8.2	11,330	12,340
Palm kernel oil ...	...	16,720	16,720
Timber ...	10.0	7,540	8,380

The gross calorific values as given in Table I are greater than can be obtained on burning the fuels in a furnace because the moisture present has to be converted into steam, and the hydrogen content is burnt to water which also escapes as steam. The conversion of one pound of water into steam consumes approximately 1100 B.T.U.* and it may be added that hydrogen produces 9 times its weight of water.

† One B.T.U. is the amount of heat required to raise by one degree Fahrenheit 1 lb. of pure water at or about 39°F. For practical purposes it can be regarded as 1/180th of the amount of heat required to raise the temperature of 1 lb. of water from freezing to boiling point.

* If allowance is also made for the heat consumed in superheating the steam from the boiling point of water, 212°F., to an assumed flue temperature of 700°F., the loss of heat occasioned by one pound of water in the fuel is increased from 1100 to 1334 B.T.U. It is not intended in this article, however, to differentiate the superheated steam from any of the other flue gases.

The high calorific value of the air-dry pericarp residue is due to the presence of palm oil, which has a value of 17,580 B.T.U. compared with approximately 7,000 B.T.U. for the oil-free material on a similar basis.

Relationship between Moisture Content and Calorific Value.

Every effort should be made to reduce the moisture content of any waste product used as fuel to avoid loss of the heat wasted in evaporating excess moisture. This applies particularly to the pericarp residue from the depericarping screen and to a lesser extent, to the fragments of shell, if the wet method of separation has been employed. Fragments of shell from the Wilder dry separator may, however, be used direct.

Both nut-shells and pericarp residue should, therefore, be spread in thin layers on the floor of the factory to dry before being fed to the furnace. Further, timber should be cut and stacked, if possible, some weeks in advance to allow it to dry.

The use of material with a high moisture content is obviously uneconomical for two reasons, namely, the extra weight of material involved and the consumption of heat necessary for vapourising the moisture.

The calorific value of moist fuel (B.T.U. per lb.) is much less than of dry fuel; for example, air-dry pericarp residue may have twice the calorific value of the moist material; but naturally the latter is correspondingly heavier, and therefore for a given batch of such a waste product, failure to dry it before firing simply involves the loss of heat required to vapourise the water it contains (1100 B.T.U. per lb.), always assuming that the waste product is never so moist as to "damp" the fire or create excessive smoke.

Reduction of moisture content to about 10 per cent. is the best that can be achieved by air-drying in Malaya and it is realised this is not attainable for all materials under average factory conditions. In power units burning coal, the fuel is frequently watered before firing, the loss of heat thereby occasioned being more than compensated by the greater evenness of combustion on the fire bed. Similarly, it is not advantageous to fire pericarp residue in too dry a state.

Firing of Boiler Furnace.

Experience shows that the economical use of fuel depends to a very considerable extent on the skill of the attendant, who should pay special attention both to the thickness of the layer of combustible material on the fire-bars and to the air supply to the grate. If the layer of fuel is too thick, and insufficient air is present, combustion will be incomplete and much smoke will be emitted from the chimney-stack; on the other hand, if the layer is too thin and an excess of air is admitted, the fire is apt to burn too fiercely, much heat being lost in the excessive draught produced.

Considerable economies are possible, therefore, in the fuel requirements of the factory if the attendant pays constant attention to the state of the fire and is also familiar with the adjustment of the damper,

Boilers vary in design and possible efficiency. Where a boiler is not sufficiently lagged or provided with adequate heat insulation, the direct loss of heat by radiation to the surroundings is evident. For burning wood and other bulky fuels a larger grate area and more capacious fire-box are necessary than in coal-burning boilers.

Feed-Water for Boiler.

A suitable water supply is necessary; for if impure water is used without any pre-treatment, a non-conducting scale may be deposited on the interior surface of the boiler, seriously reducing its efficiency.

The heat available in the exhaust steam supply should also be utilised by installing a feed-water heater for the boiler, thus saving fuel and increasing the output of the boiler. It is estimated that a rise of 10°F . in the temperature of the feed-water represents a saving in fuel of approximately 1 per cent. Since there is a difference of roughly 120°F . between the normal temperature of feed-water and the boiling-point of water it will be seen that considerable economies are also possible in this direction.

Calculation of Boiler Efficiency.

The relationship between the quantity of heat units supplied in the fuel and delivered as steam may be regarded as the overall boiler efficiency. The figure is usually expressed as a percentage.

The quantity of heat units supplied in the fuel is calculated from (a) weight of fuel and (b) net calorific value at known moisture content; the quantity of heat units delivered in the steam from (a) weight of water evaporated and (b) pressure at which steam is delivered.

Losses in efficiency occur in the following ways: (a) moisture content of fuel, (b) unburnt fuel in ash, (c) sensible heat in flue gases, (d) combustible gases and solids in flue gases and (e) heat lost from the boiler by radiation and otherwise.

As far as palm oil factory practice is concerned, the above losses may be divided into avoidable and unavoidable losses. Attention has already been drawn to the importance of reducing as far as possible the moisture content of any waste product used as fuel, while the presence of an excess of unburnt fuel in the ash is a reflection on the capabilities of the attendant in charge of the furnace.

Although in large steam-raising plants flue gases are used as a source of heat for the feed-water for the boilers, the consumption of fuel in the average palm oil factory is not considered large enough to warrant the installation of the necessary plant. The escape of large amounts of smoke and combustible gas (e.g. carbon monoxide) into the flue is due to inefficient stoking.

Fuels such as nut-shells and oil-free pericarp residue and even wood, being largely made up of carbohydrate, contain roughly 50 per cent. of oxygen and 6 per cent. of hydrogen. As a consequence of the already combined oxygen,

Table II.
Details of Fuel Consumption in Boiler Tests.

Serial No. of Test	Duration of Test	Nature of Fuel Consumed.								
		Nut-Shells			Pericarp Residue			Timber		
		Amount	Moisture Content	Calorific Value	Amount	Moisture Content	Calorific Value	Amount	Moisture Content	Calorific Value
	hours	lbs.	per cent.	B.T.U.	lbs.	per cent.	B.T.U.	lbs.	per cent.	B.T.U.
No. 1	3				749	38.0	6260	672	22.0	6290
No. 2	3	777	21.0	6910	554	44.0	5550	560	29.0	5630
No. 3	2	517	21.0	6910	320	49.0	4950	336	28.0	5730

Note.—The calorific values given in this table are corrected for the moisture present in the fuel. Since 1 lb. of a fuel containing 6 per cent. hydrogen will yield 0.54 lb. of water when burnt, a further 590 B.T.U. per lb. of dry fuel must be deducted.

more than half the weight of the fuel is useless from the start as a source of heat, and since the hydrogen on combustion must yield water amounting to over half the weight of the fuel, the heat necessary to vapourise this water is lost. This, however, is really a matter of fuel efficiency and strictly has nothing to do with the question of boiler efficiency, for once any given fuel is chosen its innate disadvantages are inseparable from it. No amount of skill in boiler design or operation can alter the net calorific value of nut shells or pericarp residue. All that can be done to the fuel is to make it as dry as possible before firing, though a moisture content of roughly ten per cent. has to be faced under the best conditions.

Summary of Boiler Tests at Serdang.

Records of three boiler tests carried out in the palm oil factory at Serdang are given in Tables II, III and IV. Table II gives the details of fuel consumption; Table III those of the net heat generated; Table IV those of water consumption, while the composition of the furnace ash is shown in Table V. The calorific value of the combustible material in the ash has been taken as 6000 B.T.U.

As a result of the data available a statement showing the overall boiler efficiency in each case, has been compiled and is shown in Table VI.

Table III.
Net Available Heat From Fuel.

Serial No. of Test	Nut-shells	Pericarp Residue	Timber	Total
	million B.T.U.	million B.T.U.	million B.T.U.	million B.T.U.
No. 1	—	4.415	3.919	8.334
No. 2	5.008	2.892	2.918	10.818
No. 3	3.331	1.488	1.782	6.601

Note.—In the above table it has been assumed that all the fuel contained 6 per cent. of hydrogen.

Table IV.
Details of Water Consumption in Boiler Tests.

Serial No. of Test	Duration of Test	Amount of Water Consumed	Average Boiler Pressure during Test	Heat delivered in Steam
	hours	gallons	lbs. per sq. inch	million B.T.U.
No. 1	3	390	140	4.423
No. 2	3	400	135	4.532
No. 3	2	290	120	3.280

Table V.
Composition of Ash from Boiler Furnace.

Serial No. of Test	Duration of Test	Amount of Ash	Loss on Ignition
	hours	lbs.	per cent.
No. 1	3	14.0	18.3
No. 2	3	17.5	22.9
No. 3	2	14.0	11.1

Table VI.
Boiler Control Statement.

		Test No. 1	Test No. 2	Test No. 3
		million B.T.U.	million B.T.U.	million B.T.U.
Heat supplied by fuel	...	8.334	10.818	6.601
Heat delivered in steam	...	4.423	4.532	3.280
		per cent.	per cent.	per cent.
Boiler efficiency	...	53.1	41.9	49.7
Loss in unburnt fuel	...	0.2	0.2	0.1

The loss due to unburnt fuel in the ash is trivial, and the very large loss of the order of 50 per cent. occurs largely in the flue gases. A direct measurement of the heat lost in the flue can only be made by recording the temperature of the escaping gases and analysing them at intervals throughout the test. The loss in the flue gases would be greater in the second test, when the regular attendant was absent and was replaced by a labourer with little previous experience. The effect of the personal factor is marked.

It will be understood that Table VI indicates strictly the boiler efficiency; that is, the proportion of heat utilised to generate steam to the total heat that the fuel, as burnt, was capable of producing. Had the fuel been more thoroughly dried it could have produced more heat, and this aspect of fuel efficiency is just as important as the actual boiler efficiency. For example, it can be calculated from Table II that in test No. 1, 358 lbs. of water in excess of the standard 10 per cent. had to be evaporated from the fuel; in test No. 2, 380 lbs.; and in test No. 3, 241 lbs. Table VII shows the heat lost through the presence of excess moisture.

Table VII.
Loss of Heat Due to Excess Moisture Over 10 Per Cent.

	Test No. 1	Test No. 2	Test No. 3
Heat lost, B.T.U. ...	394,000	418,000	265,000
Heat lost expressed as percentage of heat supplied to boiler ...	4.7	3.9	4.0

A moisture content of some 10 per cent. is inevitable in air-dry fuel of the type considered, and for practical purposes may be regarded as being like the hydrogen content, characteristic of it.

Conclusions.

In palm oil factory practice, there is a large amount of combustible waste material which ought to be made as nearly as possible to supply all the fuel required for raising steam without bringing in wood which is eventually bound to become less cheaply available.

For the furtherance of this end, it is necessary to improve if possible the efficiency of fuel and boiler; also to improve consumption.

The waste materials are not indeed efficient fuels, and all that can be done is to bring them to an air-dry condition before firing, thus minimising the losses due to evaporation of moisture.

The boiler once installed is scarcely capable of alteration, but there is scope for large economies in the method of firing, the aim being to effect complete combustion of the fuel without any excess draught. Given a suitable boiler this depends on the skill and training of the boiler attendant.

Waste of steam should be avoided by adequate heat insulation and the utilisation of exhaust steam to heat the boiler feed water. The steam engine should be one working efficiently at the normal pressure of the boiler.

These points, as illustrated by the palm oil factory at Serdang, have been tested and discussed, numerical values of the boiler efficiency being given.

In conclusion, the writers wish to acknowledge the assistance received from Mr. P. A. Bray, Superintendent, Bungsar Power Station, both as regards affording facilities for the determinations of the calorific values of the various materials and advice in the compilation of the boiler control statements.

THE PADI STRAW MUSHROOM IN KEDAH

BY

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The culture of the padi-straw mushroom, *Volvaria volvacea* (Bull) Quel, was described by J. A. Baker in the *Malayan Agricultural Journal* for December 1933. It has recently been discovered that the fungus occurs naturally in Kedah and has long been known to the Malays as "*kulat jerami*".

Following the publication of the article referred to above, the Department of Agriculture introduced spawn of the mushroom from Province Wellesley and from it raised a few specimens in a specially prepared bed of padi-straw in Alor Star. After the harvest early in 1934, another bed was formed at the Telok Chengai Experiment Station and sown with spawn from the original one. Owing, it is thought, to rather dry weather conditions, not a single mushroom was produced. The straw from this sterile bed was subsequently scattered over the padi field in which it was situated and ploughed into the soil.

As it was hoped to obtain a large supply of spawn from the bed, a considerable quantity of straw was collected in the Station and made into a small stack to provide material for further experiments. The stack was roughly covered with '*atap*' to keep out rain and preserve the straw; it was not disturbed in any way. The temporary roof decayed in due course and rain-water entered freely. Following four months of heavy rainfall—July to October—the straw partially decayed.

At the beginning of November, exceedingly fine specimens of *Volvaria*, which were often six inches, or more, in diameter, commenced to be produced near to the base of the stack. As the mushroom grew without the artificial introduction of spawn, it was evident that it had occurred naturally.

When specimens were shown to Malay padi-planters they immediately recognised them and could recall numerous instances when supplies of the fungus had been collected from heaps of straw used for bedding for live-stock and other purposes, or left undisturbed in the field after the padi had been thrashed. In order to confirm these statements investigations were made in the Kota Star District in the month of November and many examples were discovered on large heaps or stacks of straw.

The fungus appears to be indigenous and widely distributed. Under natural conditions fruiting bodies are produced chiefly during the long wet-season which, in Kedah, extends from June to November. The mushroom is much prized as an article of food, especially by Chinese; as it can be dried successfully it can be preserved indefinitely.

During the long wet-season the fungus could, without doubt, be cultivated and produced in quantity, and also in drier months of the year, provided close attention were paid to watering and the shading of the tops and sides of the

THE PADI-STRAW MUSHROOM IN KEDAH.

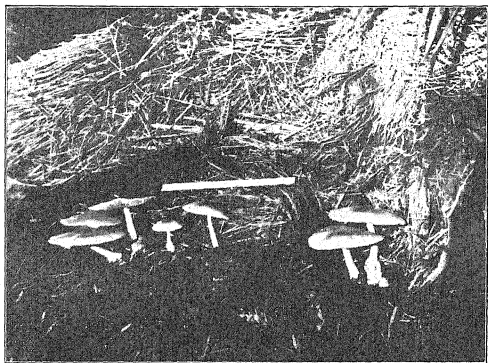


FIG. I. *Volvaria volvacea* growing naturally on padi-straw.

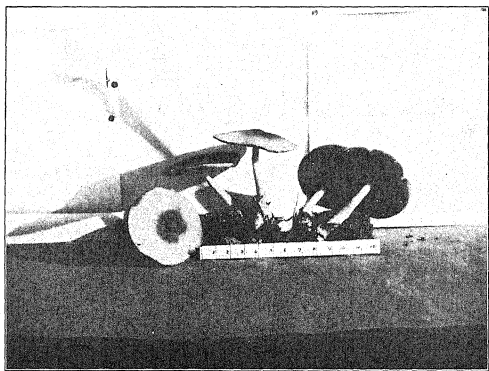
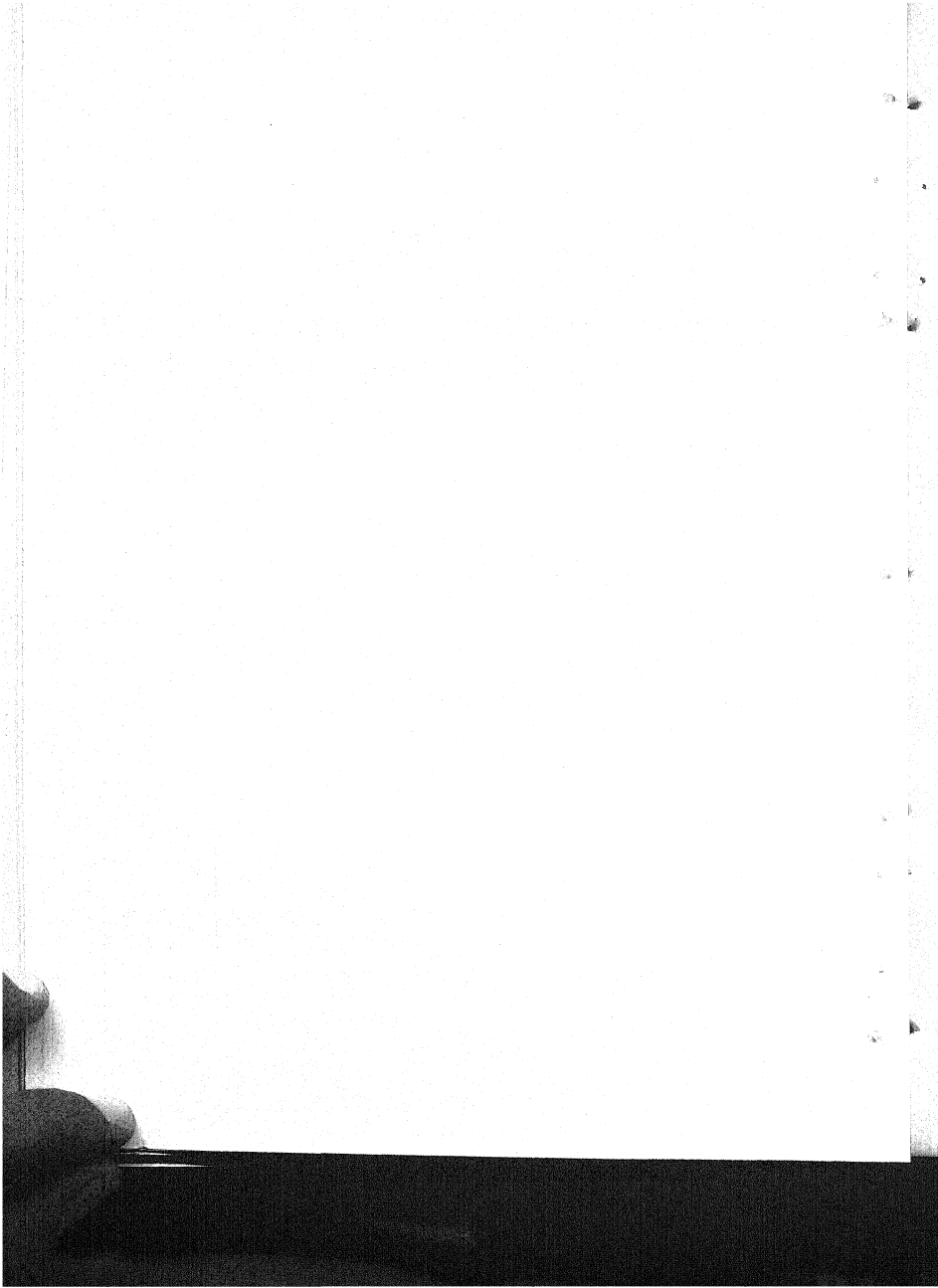


FIG. II. Specimens of *Volvaria volvacea* showing general characters.



beds to maintain humid conditions. It is now considered that partial, or complete failure to grow the mushroom in the past has been due, more particularly, to the absence of suitable protection from sun and wind.

The photograph, Fig. 1, shows the mushroom growing near to the base of a heap of padi-straw, and Fig. 2, the characters and general appearance of the fungus. The specimens shown in each photograph were produced on straw that was freshly collected in the field after harvest, and no spawn from a previously infected source, such as a cultivated bed, was mixed with it.

NOTE ON THE FROTHING OF GROUNDNUT OIL

BY
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Assistant Analyst.

Enquiries have been received recently regarding the possibility of eliminating the frothing effect which is noticeable when certain brands of groundnut oil are heated.

This frothing tendency is more marked with the local oil than with the imported oil.

Experiments carried out by the Chemical Division show that frothing can be correlated both with the mode of expression of the kernels and with the extent to which the crude oil is refined before use.

If the kernels are crushed and the meal pressed without heating, the resultant oil after filtration does not exhibit any frothing tendency. If, however, the residue from the cold expression is ground and the meal heated and pressed to recover a further quantity of oil, the latter, even after filtration, froths on heating. A similar effect is noticeable with oil recovered by grinding the kernels to a fine state of division and subjecting the heated meal to a single heavy pressing.

By allowing the filtered oil from the subsidiary treatment of the meal or from the whole treatment of the kernels after grinding and heating to settle for a period of a fortnight or three weeks and then drawing off the supernatant oil without disturbing the sediment it will be found that the frothing tendency can be practically eliminated from the settled oil. Alternatively, if the crude oil is treated with caustic soda, the refined oil, after washing with water to remove soluble soap and excess alkali followed by filtration, will not be found to froth when heated. Treatment with caustic soda removes in addition the free fatty acids present in the oil.

As far as can be ascertained therefore, frothing is due to the presence of very small amounts of kernel tissue which pass through with the oil when expressed and which are not removed as a result of the ordinary filtration process. The amount of extraneous matter is very small as frothing is not accompanied by the separation of any perceptible amount of coagulable matters, for example, mucilage or proteid substances, which are also present in the kernels.

It is reasonable to suppose that by grinding the kernels to a fine state of division and by subjecting the heated meal to a heavy pressing there will be a tendency for an increased amount of kernel tissue to be expressed with the oil.

Further, it is well known that sedimentation of an oil is accompanied by the formation of a precipitate which occludes any extraneous matter that may have been expressed originally with the oil.

While sedimentation is more economical than refining the oil with caustic soda, the former process involves the provision of storage tanks in which the oil can be left undisturbed for the required period.

An alternative solution would appear to consist in recovering the available oil by two stages; a cold-pressed oil which could be filtered and marketed, a smaller quantity of hot-pressed oil which would require to be settled as described. In this case much less storage tank accommodation would be required.

The adoption of this method of treatment would bring local oil mill practice into line with established European practice for the treatment of oil seeds in which the latter are invariably crushed and pressed in the cold, thus recovering approximately 70 per cent. of the available oil as a "first quality oil". The remainder of the available oil is recovered by reducing the residue to a fine state of division, and hot-pressing the meal. This oil is always regarded as "second quality" compared with the cold-pressed oil.

CONDITIONS ON SMALL RUBBER HOLDINGS IN MALAYA.

4th Quarter, 1934.

*Prepared by the Economics Branch of the Department of Agriculture,
Straits Settlements and Federated Malay States, in collaboration
with the Field Branch of the Department.*

Rainfall.

The outstanding feature of the weather conditions of the quarter was the exceptional dryness of December experienced throughout Malaya. October and November were, as usual, wet months and normal rainfalls were recorded.

Prices.

There was a distinct fall in prices paid for small-holders' rubber during the last quarter of 1934, although in a few cases the higher levels of the previous quarter were reached.

Table I shews the lowest and highest prices at which rubber was purchased by dealers in each State and it will be seen that the difference between the extremes has increased to a certain extent.

Table II should be read in conjunction with Table I and shews the mean of lowest and highest prices paid at a number of centres in each State during the quarter.

Production.

Table III, which is included for the first time, shews the total production of small holdings for the year 1934, and, for the purpose of comparison, the production of each quarter. This table is compiled from the monthly report of stocks, production, imports and exports of rubber, published by the Registrar-General of Statistics, Straits Settlements and Federated Malay States.

Tapping.

Most reports indicate that the heavy rains of October and November resulted in severe tapping in December to cover coupon requirements. In Pahang South, towards the end of the year, tapping was stopped in a number of holdings owing to the padi harvest. More conservative tapping was reported from Negri Sembilan—ten to sixteen days monthly—and high tapping was much in evidence with double tapping cuts. The improvement in tapping methods was continued in South Kedah. Reports from Perak indicate that there is a general tendency towards much more careful tapping than formerly in respect of rubber recently brought into bearing for the first time. In Malacca tapping continued to be heavy throughout the quarter.

Table I.
Lowest and Highest Rubber Prices Paid by Local Rubber Dealers.
(In Straits dollars per picul (133 1/3 lbs.))

4rd Quarter 1934.

	Penang	Perak	Selangor	Negeri Sembilan	Pahang	Malacca	Kedah	Johore
Smoked sheet	23.00-30.00	20.40-22.90	OCTOBER		20.00-30.10	23.00-29.00	24.00-31.00	22.00-30.60
Unsmoked sheet	20.00-28.50	20.00-26.50	24.00-29.00	23.00-30.00	20.75-28.00	21.00-27.00	22.00-26.00	17.50-28.80
Scrap	10.00-15.00	4.00-16.50	22.00-28.00	20.00-28.30	—	13.00-15.00	9.00-15.00	2.00-15.00
			13.00-16.00	13.00-16.00				
			NOVEMBER					
Smoked sheet	21.30-28.00	17.95-26.45	21.00-28.00	20.00-28.30	21.00-26.40	22.00-25.00	23.00-27.50	20.00-26.60
Unsmoked sheet	18.00-27.00	18.00-25.00	19.00-23.00	18.00-24.60	18.00-22.60	20.00-23.00	18.60-24.30	17.00-26.00
Scrap	8.50-18.00	12.00-15.00	12.00-15.00	11.00-13.00	10.00-11.00	12.00-14.00	8.00-14.00	3.00-17.50
			DECEMBER					
Smoked sheet	21.50-26.50	18.75-26.00	22.00-25.00	13.00-26.20	20.00-25.50	22.00-25.00	20.00-25.46	20.00-25.00
Unsmoked sheet	18.00-24.50	19.00-23.60	19.00-22.00	19.00-24.00	18.75-24.00	21.00-24.00	21.00-23.50	18.00-23.50
Scrap	9.00-17.00	12.50-14.00	10.00-15.00	12.00-16.50	—	13.00-15.00	12.00-14.00	3.00-14.00

Table II.
Mean of Lowest and Highest Rubber Prices Paid by Local Dealers
at a number of Centres in each State.
(In Straits dollars per picul (133 1/3 lbs.))

4th Quarter 1934.

	Penang	Perak	Selangor	Negri Sembilan	Pahang	Malacca	Kedah	Johore
			OCTOBER					
Smoked sheet	26.57-28.12	25.57-27.88	25.63-28.33	24.30-28.45	23.58-27.83	24.33-27.00	25.77-28.00	25.00-27.64
Unsmoked sheet	23.90-26.30	23.85-25.49	23.75-26.25	22.17-26.22	22.45-25.99	22.06-25.33	22.75-24.87	21.92-25.10
Scrap	11.00-14.50	14.00-14.75	13.35-15.25	13.00-14.50	—	13.66-15.00	11.87-13.18	10.57-12.23
			NOVEMBER					
Smoked sheet	23.00-26.12	22.89-24.39	22.58-25.25	21.87-25.82	21.39-24.29	22.33-23.66	24.00-25.62	22.35-24.93
Unsmoked sheet	21.30-25.10	20.27-22.73	19.50-21.75	19.67-22.85	19.30-21.82	20.06-22.33	21.27-23.08	19.97-22.58
Scrap	12.00-14.50	13.50-14.50	12.25-14.50	11.00-13.00	10.00-11.00	12.66-13.66	10.75-12.25	9.53-12.23
			DECEMBER					
Smoked sheet	23.37-25.25	23.82-24.47	22.75-24.25	20.57-23.48	21.00-24.07	23.66-25.00	22.50-24.47	22.32-23.81
Unsmoked sheet	20.90-23.56	20.06-22.18	20.00-21.33	20.33-23.08	19.35-22.46	21.66-23.33	21.62-22.50	20.52-22.40
Scrap	11.50-13.87	12.75-13.50	11.25-14.50	12.50-14.75	—	13.33-14.66	12.67-13.87	8.91-10.77

Table III.

Production of Rubber on Small Holdings during the year 1934.
(in tons)

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Total for year
Federated Malay States ...	32,492	24,211	23,158	24,280	104,141
Unfederated Malay States ...	22,094	19,343	20,363	19,659	81,459
Straits Settlements ...	7,823	6,871	6,831	9,878	31,403
Total ...	62,409	50,425	50,352	53,817	217,003

Areas out of Tapping.

Estimates of areas untapped on small holdings were as usual obtained by counting the number of such areas and applying the percentage thus obtained to the total area of small holdings in the District.

Table IV shews the result of the survey in December, and a slight increase is noticeable in the areas which have come into tapping. The total of areas out of tapping on small holdings in the Federated Malay States was estimated to be 41,000 acres at the end of December, 1934, as compared with 42,600 acres at the end of the third quarter. The relative figures for the Straits Settlements were 11,600 acres and 13,900 respectively.

Condition of Holdings.

The general standard of upkeep of small-holdings continued to shew improvement, the clearing of undergrowth receiving an impetus due to the fear of low assessment for overgrown areas. In Perak Central a few young holdings were brought into tapping. Reports from Penang and Province Wellesley state that bark consumption was heavy during the quarter and wounding general. A few Chinese in the Kuantan District are reported to have been digging new catchment pits to prevent soil wash; the general practice, however, is to allow a natural cover to grow which is slashed at regular intervals.

Diseases.

Mouldy Rot was the only disease which called for particular comment during the wet months of October and November, but the exceptional dry weather of

Table IV.
Estimated Acreage of Tappable Rubber which was out of Tapping on Holdings of less than 100 Acres, at the end of December, 1934.

PERAK				SELANGOR				NEGRI SEMBILAN				PAHANG			
District	Total Tappable area	Total untapped area	Percentage	District	Total Tappable area	Total untapped area	Percentage	District	Total Tappable area	Total untapped area	Percentage	District	Total Tappable area	Total untapped area	Percentage
Batang Padang	37,288	1,100	3	Klang	18,879	1,100	6	Seremban	19,241	1,300	7	Raub	7,361	100	1
Kinta	34,100	1,700	5	Kuala Langat	28,853	2,000	7	Tampin	17,947	1,800	10	Kuala Lipis	15,951	2,100	13
Kuala Kangsar	43,495	2,600	6	Ulu Langat	38,897	4,300	11	Kuala Pilah	17,470	1,000	6	Bentong	13,000	3,500	26
Upper Perak	13,774	1,100	8	Ulu Selangor	20,632	1,500	5	Jebeu	6,270	300	4	Other Districts	31,223	47,000†	15†
Larut & Selama	51,407	3,600	7	Kuala Lumpur	21,174	1,600	8†	Port Dickson	10,953	700†	7†				
Krian	9,751	1,300	13	Kuala Selangor	9,379	700	8†								
Lower Perak	47,937	2,970*	6*												
	237,822	14,300	6		148,194	11,500	8		71,581	5,100	7		68,135	10,400	15

MALACCA				PENANG & P. WELLESLEY				SINGAPORE			
District	Total Tappable area	Total untapped area	Percentage	District	Total Tappable area	Total untapped area	Percentage	District	Total Tappable area	Total untapped area	Percentage
Central	17,687	1,400	8	North	5,241	300	8	Singapore	12,781	300	2
Alor Gajah	31,387	4,100	13	Central	7,067	1,300	18				
Jasin	24,971	1,200	5	South	8,149	nil	nil				
				Dindings	7,279	2,100	29				
				Penang	11,114	900	8				
	74,045	6,700	9		36,850	4,600	16		12,781	300	2

The percentage of areas out of tapping in September, 1934, was as follows:—Perak 6, Selangor 6, the Negri Sembilan 12, Pahang 15, Malacca 11, Penang and Province Wellesley 15, Singapore 3.

* Estimated from percentage for Kuala Kangsar.
† Estimated from percentage for other Districts in the State.

December greatly assisted its control. Wide use was again made of fungicides sold through Departmental channels, a preference being shown for proprietary products incorporating colouring matter which can be more readily seen when painted on the tapping panel.

In Perak, persistent reports of damage by root disease were received which will receive further investigation; there would appear to be little doubt that in some localities, root disease—probably mainly *Ganoderma pseudoferreum*—is more prevalent in small holdings than has been supposed to be the case.

Grades of Rubber.

There was again considerable variation in the grades of rubber purchased by dealers, thus apparently indicating that there is no definite preference for either smoked or unsmoked sheet. The reports from the various States are analysed below, but sales of scrap are ignored as being negligible except in the case of Johore.

Kedah.—In contrast with the third quarter, there was an increase in the percentage of unsmoked sheet except in the case of the Kota Star District which shewed a slight increase in smoked sheet explained by a reduction in scrap. Average percentages were:—Kota Star: smoked 85, unsmoked 13; South Kedah: smoked 56, unsmoked 43; Baling: smoked 27, unsmoked 69; Central Kedah: smoked 46, unsmoked 50.

Johore.—The proportion of smoked and unsmoked sheet shewed little change, but the tendency was to a slight increase in unsmoked sheet with a higher percentage of scrap. Muar, Batu Pahat and Tangkak respective percentages of smoked sheet were 57, 80 and 81, while the percentages of unsmoked sheet at Panchor, Senggarang, Benut, Kukup and Pontian were 90, 85, 78, 95 and 90 respectively. The percentage of scrap varied principally from 10 to 22.

Perak.—In the District of Krian and Selama Sub-district there was no change recorded in the proportion of grades purchased as compared with the previous quarter. The percentages were:—Krian: smoked 30, unsmoked 70; Selama: smoked 80, unsmoked 20.

There was a slightly increased proportion of smoked sheet in Perak North and Perak South, the average for all centres in Perak North being 34 per cent. as compared with 28 per cent. in the last quarter. For Perak South the respective averages were 37.3 per cent. as compared with 33.6 per cent.

Comparing the Perak North figures with those for the first quarter of the year, a very considerable increase in the proportion of smoked sheet dealt in is indicated.

In Perak Central there was a slight increase in unsmoked sheet at Kuala Kangsar, the figures being smoked 56 per cent., unsmoked 41 per cent. At Lenggong the position was reversed, the proportions being: smoked 28 per cent., unsmoked 72 per cent.

Selangor.—Smoked sheet continued to be made in the coastal Districts and more interest was taken in this grade in the inland Districts as the small-holders realised that it was not profitable to sell unsmoked sheet with coupons.

Penang, Province Wellesley and Dindings.—In Penang, sales were again entirely of unsmoked sheet with a small proportion of scrap. In Province Wellesley, sales were principally of unsmoked sheet but in the Dindings the proportions were: smoked 51 per cent., unsmoked 43 per cent.

Malacca.—The percentages of purchases were as follows:—Central: smoked 61, unsmoked 29; Alor Gajah: unsmoked 92.40, scrap 7.60; Jasin: smoked 64, unsmoked 34.

Negri Sembilan.—There was again considerable variation in the grades sold in the various Districts and the average percentages for the State were:—smoked 53.2, unsmoked 45.3.

Pahang.—In the Kuantan District all rubber is sold as smoked sheet. In Pahang South, 95 per cent. of the Chinese produce smoked sheet, but only 5 per cent. of the Malays, the product of the latter being mainly in the form of unsmoked sheet.

General.

In Perak the Asiatic Rubber Instructor has included in his lectures a reference to the special advisability under the present rubber regulations for small-holders to sell only fully dried smoked sheet, and has pointed out the loss they incur in selling wet rubber covered by coupons up to its full wet weight. Action is being taken to instruct all Department officers in Perak to take every opportunity of making this information widely known.

No cases of cutting out of rubber in favour of food crops have occurred, but in Sitiawan, Perak, applications for kampong land for food crops have been made since rubber regulation was introduced.

Selected Article.

RUBBER UNDER THE RESTRICTION SCHEME*

Price, Stocks, and Consumption Prospects

BY

J. E. NATHAN.

The preamble to the international rubber agreement states as the first object of the scheme the reduction of existing world stocks to a normal figure. At the beginning of May, when the agreement was signed, stocks of rubber in the United Kingdom and the United States of America, afloat from the East, and in the ports of Singapore, Penang, and Colombo, amounted roughly to 625,000 tons; at the end of September they totalled 655,000 tons, and by the end of the year it is certain they will be appreciably higher.

It is not surprising, therefore, that the recent decision of the International Committee to increase the rate of release from 70 per cent. in December to 75 per cent. in the first quarter of 1935 came as a shock to the market. It is a clear indication that the committee do not at present desire a higher price, and that in order to keep the price from rising they have been compelled to ignore the stock position. The decision came as no surprise to those who have studied the working of the scheme in the Dutch East Indies, but it was an unpleasant shock to speculators, who have bought rubber for forward delivery at much higher prices.

Native Rubber in D.E.I.

It is the control of native rubber in the Dutch East Indies which is causing all the difficulties. In Malaya every small native holding is surveyed and registered; the District Land Officer knows how much rubber each native owns, can assess his production, and issue export permits similar to those issued to large estates. In Sumatra and Dutch Borneo, however, there are vast areas of native rubber unsurveyed and unregistered; to introduce a system of individual licences would entail a long period of preliminary work. The Government have, therefore, endeavoured to keep the exports of native rubber within the quota by means of a heavy export tax, at present about 3d. per pound. A price of 6½d. in London is equivalent to 5¾d. in the Netherlands East Indies for standard rubber, and, as native rubber is worth appreciably less than standard, it will be seen that at present prices the native gets comparatively little for his rubber. Only those natives whose holdings are within a reasonable distance of the port of export find it worth while to tap their rubber; the more distant holdings are not tapped and so the exports are kept down.

Apparently there is little dissatisfaction with the system among the native growers. It must be remembered that during the slump native owners far in the interior ceased to tap their rubber, owing to the low price, and turned their attention to other products. To-day they are appreciably better off, in

*Reprinted from *The Manchester Guardian Commercial*, 7th December, 1934.

that their taxes have been remitted, and the Dutch Government is carrying out public works of many kinds in these districts. It is using the proceeds of the heavy export tax, which already amount to over £1,500,000, to construct roads and build schools and hospitals.

It is clear that under this system every advance in price expands and every fall in price contracts the circle within which it is profitable for the natives to tap and sell their rubber. When the price was 7½d., Dutch native exports were about 15,000 tons a month; at the price of 6½d. they appear to be about 6,000 tons a month. The permissible export in the first quarter of 1935 is 10,500 tons a month, so that 7d. is apparently the price which would keep these native exports in line with their quota, as long as the export duty remains unchanged.

While this system is unquestionably the easiest to administer it cannot but be unsatisfactory to the other signatories of the scheme and also to the European estates in the Dutch East Indies.

Fortunately there are signs that the Netherlands East Indies Government is making serious attempts to evolve an alternative method. The individual assessment system is to be introduced in some of the smaller areas at the beginning of next year, and while this method may be impracticable in Borneo and South Sumatra it should be possible to carry out regulation there by some method of district quotas and Government monopoly of purchase.

In June, 1934, the releases were fixed on a very liberal scale, in order to give the Netherlands East Indies Government time to overcome its administrative difficulties. The release for the first quarter of 1935, which is again a generous one, means that further time is required for this purpose, but nevertheless it is certain that early in 1935 world stocks will begin to be reduced.

Rising Consumption.

If we turn from the regulation of production to consideration of the consumption of rubber, the picture is a bright one. Consumption figures for the last three years are as follows:—

		1932	1933	1934 (Nov. and Dec. estimated)
		Tons.	Tons.	Tons.
United States	...	332,100	405,700	440,000
Rest of the world	...	354,500	410,000	475,000
Total	...	686,600	815,700	915,000

1932 was, of course, a year of low absorption; in 1929 world absorption was just over 800,000 tons, and the year 1933 did no more than mark a return to that level. The increase in 1934, however, of over 12 per cent. over 1933 is most encouraging, and there appears to be a fair prospect of the absorption next year being close on 1,000,000 tons.

The United States is the only country publishing data which divides the absorption of rubber according to the classes of goods in which it is used. Statistics show that in 1933 in the United States 77 per cent. of the rubber used went into motor-car tyres and 23 per cent. into other goods. The latter percentage has gradually risen, but very slowly, from 17 per cent. in 1929.

Such data as are available for other countries tend to show that between 50 per cent. and 60 per cent. of the rubber absorbed is in motor-car tyres and tubes, and that, as in the United States, this percentage tends to decrease every year. It may roughly be said that motor-car tyres and tubes accounted for three-quarters of the world's absorption of rubber in 1929 and two-thirds in 1933.

The peak year of motor-car registration was 1930; in that year there were 26,697,000 cars registered in the United States and 9,200,000 in other countries. In 1933 the United States figure had dropped to 23,800,000, but the cars registered in other countries had risen to 9,500,000.

U.S.A. Car Output.

In 1929 the output of cars in the United States was 5,358,000; in 1932 the output was 1,371,000 cars, and this figure rose to 1,959,000 in 1933 and to 2,217,000 for the first eight months of 1934. Next year the Ford Company plan to produce a million cars, and with even a moderate improvement in general conditions in America the output of motor-vehicles is certain to show a further increase.

Factory stocks of tyres at the end of August were 8,697,000, compared with 11,981,000 at the end of April and a peak figure of over 13,600,000 in 1928. With the increase in prosperity there is no longer a tendency for owners to run their tyres down to the canvas, and both from the point of view of car production and tyre replacement 1935 promises to be a good year.

A moderate estimate of American absorption of rubber next year would be 460,000 tons, and it may easily be nearly half a million tons.

The following table shows the absorption figures for the last three years in the chief rubber-consuming countries outside the United States:—

		1932	1933	1934 (Oct. / Dec. estimated)
		Tons.	Tons.	Tons.
United Kingdom	...	78,000	79,000	105,000
Japan	...	56,000	67,000	70,000
France	...	42,000	63,000	52,000
Germany	...	45,000	54,000	55,000
Russia	...	30,000	31,000	52,000
Italy	...	15,000	19,000	20,000
Scandinavia	...	7,000	7,000	10,000
Australia	...	12,000	13,000	12,000
Canada	...	21,000	19,000	27,000

It must be emphasised that these figures are absorption figures; they include any additions to invisible stocks, but on the other hand they exclude rubber which has been taken from invisible stocks accumulated in previous years. In the case of the United Kingdom it is probable that invisible stocks have increased and that the real consumption is appreciably less than 105,000 tons. In France, however, it is almost certain that manufacturers have drawn on stocks accumulated before 1934, while Germany imported at the rate of 75,000 tons per annum in the first half of the year, and during the second half has been using the surplus she then accumulated.

Russian Rubber Industry.

The rubber industry in Russia is making phenomenal progress, but unfortunately one of the chief aims of the Russian Government is to make the country independent of imported rubber. With this object in view they are doing their utmost to develop rubber-producing plants, mainly the plant called Tan-sagiz, within their own territories, and have also constructed a number of large factories to produce synthetic rubber from alcohol. The output of natural rubber is said to be negligible at present, not more than a few hundred tons, and although a production of over 12,000 tons is planned for 1940 it is improbable that anything like this figure will be reached.

As regards synthetic rubber, however, much more intensive work is being carried out, and the output in 1934 will certainly total 5,000 tons. The quality appears to be fairly good, and the cost, though far higher than that of imported rubber, is a matter of indifference to the Government, as the money is all spent in Russia.

It is quite possible that in a few more years Russia will herself produce as much rubber as she consumed in 1933, but her production of tyres and rubber goods is growing so rapidly that in spite of this her imports of rubber will probably go on increasing for several years to come.

For the first three months of 1935 the percentage of release has been fixed at 75; the quotas are increased next year to 1,088,000 tons and monthly exports of rubber may be calculated as follows:

Countries included in the scheme	...	...	...	...	Tons. 68,000
Rest of the world	...	...	...	...	5,000
					<hr/> 73,000

Against this figure of 219,000 tons for the first quarter of the year absorption is likely to be 250,000 tons, so that world stocks, which have steadily increased in 1934, will show an appreciable decline. April, May, and June are usually the months of heaviest consumption, and if the release is maintained at 75 per cent. the process of reducing world stocks to normal, the first object of the regulation scheme, should be accelerated.

Difficulties Being Overcome.

During the past few weeks there has been from time to time great nervousness both in the rubber market and the rubber share section of the Stock Exchange. Surprisingly few investors had any knowledge of the practical difficulties entailed in organising the administration of the regulation scheme in the East, and were inclined to panic on any sign that everything was not proceeding smoothly. Those who had such knowledge, expected in the first year of administration far more hitches than have actually occurred; at the same time they were and are confident that such difficulties will be overcome, and that the scheme will run at least for the agreed period of $4\frac{1}{2}$ years.

The suggestion in a section of the London press that the Dutch Government is already desirous of breaking an agreement which it signed a few months ago may be ignored. It could not have been made by anyone with knowledge of the Dutch character; there is no nation more scrupulous in honouring its bond.

Reviews.

Rubber and Agriculture.

64 pp. Illustrated. *The Rubber Growers' Association, London, 1934.*

The production of suitable tyres has been responsible to a large degree for the development of mechanical arable farming. While the use of rubber in other directions on the farm has also proved of value, its material help as an accessory in those implements which prepare the soil for the reception of the seed or are used in connexion with harvesting is rightly given first consideration in this book.

It is claimed that the introduction of rubber tyres to farm implements and vehicles on the farm has not only lightened the burden of farm work but has resulted in the speeding up of production.

These claims are not exaggerated. The importance of taking advantage of suitable weather conditions is recognised as a necessity of good farming. Such weather conditions are often of short duration and under the older methods of farming, the advent of adverse weather frequently overtook the farmer, with disastrous results to the quality and quantity of his crop. The speed with which farm work can be performed with suitable mechanised gear has enabled him, to a large extent, to take full advantage of suitable spells of weather.

The old type of tractor wheel was liable to pack the soil and therefore could not be efficiently worked, especially for harrowing and light cultivation. This problem was not solved by the advent of the high-pressure tyre; such tyres were found to be unsatisfactory, due possibly to a combination of cost, high air pressure and the lack of a proper non-skidding design.

The introduction of low-pressure tyres to aeroplanes enabled these machines to operate regardless of field conditions. This observation led to the idea that large-section tyres could with equal advantage be used in connexion with farming operations. Subsequent tests have proved that higher speeds are obtainable; there is greater economy of fuel, a reduction of vibration and reduced wear and tear on tractors equipped with suitable low-pressure tyres.

This book may be looked upon as an introduction to the consideration of the wider use of rubber in farmwork. While prominence is given to the use of rubber equipment for tractors and pneumatic equipment for horse or tractor-drawn vehicles, attention is also drawn in other sections of the book to such uses as moveable floors for lorries, rubber for cow stalls, its use in the dairy and farmhouse, and to other uses of rubber in agriculture.

The numerous illustrations are of considerable aid to the text and the publication presents a convincing argument in favour of the extended use of rubber in agriculture.

D. H. G.

Departmental.

FROM THE DISTRICTS.

Compiled by the Chief Field Officer from Monthly Reports submitted by Field Officers.

The Weather.

With the exception of the coastal areas along the eastern seaboard where heavy rainfalls in excess of the average were experienced, normal weather conditions for January prevailed throughout the Peninsula.

Remarks on Crops.

Rubber.—Prices in most centres remained steady during the month, and were comparable with those ruling at the close of the year.

Dry weather conditions, which have persisted since early in December, have accelerated wintering and crop production is reported to have declined. Weather conditions have also favourably reacted on the incidence of fungus diseases, more particularly mouldy rot disease of the renewing bark, which has in consequence been little in evidence.

Padi.—In the Jelebu District of Negri Sembilan, the riverine areas of the Lipis and Pekan Districts of Pahang, Segamat District in Johore and the majority of producing centres in Selangor, harvesting has been completed, and good progress under favourable conditions has been made in North Kedah and Kuala Muda, Province Wellesley North, Rembau, Tampin and Kuala Pilah in Negri Sembilan, the early planted inland areas of Malacca, the Raub and road mukims of Lipis in Pahang, Muar, Endau and Pontian in Johore, and in Krian and parts of the Central Districts of Perak.

Extensive flood damage in the riverine mukims of Perak has been suffered, and crop prospects are poor in consequence. In the newly developed Panchang Bedina area of Selangor, transplanting has been delayed owing to the lack of adequate water supplies, and it is unlikely that planting will now be undertaken in the northern portion of the area.

Crop prospects generally are as yet difficult to estimate. Extensive flood damage which occurred earlier in the year will materially affect the Kedah yield, and dry conditions in the late planted areas of Province Wellesley and Malacca have militated against the development of crops in those areas. In Krian, however, it is considered that with good harvesting weather, returns will not be materially less than those obtained in the previous season.

Coconuts and Copra.—Copra prices advanced sharply at the beginning of the month and touched \$5.45 per picul. This price, however, was not maintained and fell rapidly towards the end of the period under review and closed at \$4.35. Nut prices fluctuated in concert and at the end of the month varied

between \$12 and \$18 per 1,000. Fresh nuts for export to Burma from Penang and Province Wellesley advanced to \$23 per 1,000.

Copra from improved small holding kilns continues to command satisfactory prices in relation to market quotations.

In some areas, particularly the Kuala Langat District of Selangor, the manufacture of coconut oil by small holding cultivators has increased, and at present prices is found to be a profitable undertaking.

Pineapples.—In Singapore supplies of fruit considerably increased during the month and enabled all factories to commence canning. Supplies in Johore, however, are still somewhat limited and factories are not yet working full time.

New areas continue to be opened up for cultivation in Johore, where factory extensions and improvements are also taking place.

Tuba.—Rapid extensions to the area under this crop are being continued in Singapore where the price of dried root from Changi remains at between \$70 to \$80 per picul. A good market has been established for cuttings of *Derris elliptica* from the Changi district where prices up to \$20 per 1,000 cuttings have been paid for planting material. Appreciable exports of this material were made during the month.

Fruit.—In most centres the fruit season is now nearing an end and supplies are short. A good harvest of rambutans was obtained during the period under review in Province Wellesley South, and durians, langsat, mangosteen and chiku were in bearing in the Jelebu District of Negri Sembilan, where the yields were small and quality poor. Light crops of durians, machang, rambutan, mangosteen, langsat and rambai were obtained in Pahang.

Cloves.—The clove harvest is still in progress in Penang, the dried product being sold at \$35 to \$38 per picul.

Instructional Tours.

A party of twenty-five Malay agriculturists, including four Penghulus from the Temerloh District of Pahang, paid a three day visit to Malacca, where an instructional programme had been arranged by the local Agricultural Officer.

Improved methods of cultivation, crop maintenance and harvesting were demonstrated and explained at the Rice Experiment Station, Pulau Gadong; poultry management, plant propagation and small holding crops were dealt with at the Agricultural Station, Sungei Udang, and in addition, selected small holding areas were inspected to observe industries, sanitation and other features of general interest. The visitors, who made the tour at their own expense, displayed keen interest throughout, and expressed entire satisfaction with the arrangements made on their behalf. It is expected that further and larger parties will undertake similar visits in the near future.

Rural Lecture Caravan.

The Rural Lecture Caravan made a short tour in Negri Sembilan from January 9th to 16th inclusive, visiting Rantau, Kuala Sawah, Ulu Klawang and Peradong, remaining two days at each centre. Educational films were displayed on the first evening, and the afternoon and evening of the following day were devoted to lectures illustrated by models and lantern slides on subjects of general economic interest to small-holders. In all localities the film shows and evening lectures were well attended and appreciated, but afternoon proceedings were not well patronised except at Peradong where great interest was displayed and numerous points raised by the audience. The total attendances during the tour approximated 3,600.

A short tour in the Ulu Langat District of Selangor was commenced on January 26th, Beranang, Semenyih and Jendram being visited; the programme was similar to that followed in Negri Sembilan. The cinema shows on opening nights attracted from 500 to 800 people, but lectures were not well attended.



DEPARTMENTAL NOTES.

Visit of H.E. The Governor to Serdang.

His Excellency Sir Shenton Thomas, K.C.M.G., O.B.E., Governor and Commander-in-Chief of the Straits Settlements, and High Commissioner for the Malay States, visited the School of Agriculture, Malaya, and the Central Experiment Station, Serdang on 1st February, 1935. He was received by the Acting Adviser on Agriculture and by other officers of the Department of Agriculture connected with the work of the School and the Experiment Station.

Appointments.

Mr. J. Cook, B.Sc., has been appointed an Agricultural Officer with effect from 23rd November, 1934. He arrived in Malaya and assumed duty on 20th December, 1934.

Mr. H. K. Ashby, B.A., Cam. Dip. Agr., has been appointed an Agricultural Officer with effect from 23rd November, 1934. He arrived in Malaya and assumed duty on 20th December, 1934.

Mr. Choo Kok Leong, B.A. (Agric.) Oxon., has been appointed Assistant Lecturer, School of Agriculture, Malaya, from 1st. January, 1935.

Leave.

Mr. A. Thompson, Mycologist, returned from leave on 4th January, 1935.

Mr. J. H. Dennett, Soils Chemist, returned from leave on 26th January, 1935.

Statistical.

MARKET PRICES.

January, 1935.

Rubber.—There was a slight improvement in the price of rubber during January, but the market weakened at the close of the month. Opening and closing prices in Singapore for spot loose were 20½ and 20¾ cents per lb. respectively, the average price for the month for No. 1. X. Rubber Smoked Sheet being 21.25 cents per lb. as compared with 20.75 cents per lb. in December. The average price in London for January was 6.39 pence per lb. and in New York 13.01 cents gold per lb. as compared with 6.30 pence and 12.86 cents gold respectively in December.

Table I.
Weekly Prices Paid By Local Dealers for
Small-Holders' Rubber, January, 1935.

(Dollars per Picul.)

Grades.	Kuala Pilah, Negri Sembilan.				Kuala Kangsar, Perak.				Batu Pahat, Johore.			
	10	17	24	31	9	16	23	30	9	16	23	30
Smoked sheet				24.40	25.34	24.95	24.88	23.00				
Unsmoked sheet	23.68	22.66	22.01	23.18		21.00	21.04	21.26	21.63	22.07	21.10	20.05
Serap	13.30			13.00					13.36		17.17	

Transport by lorry Kuala Pilah to Seremban 15 cents per picul, to Malacca excluding duty, 25 cents per picul, by rail Seremban to Penang \$1.24 per picul, Seremban to Singapore \$3.00 per ton.

Transport from Batu Pahat to Singapore by lorry excluding duty, 90 cents per picul.

Transport from Kuala Kangsar to Prai by railway \$6.20 per ton.

Transport from Kuala Kangsar to Singapore by railway \$10.00 per ton (minimum consignment 5 tons).

At Kuala Pilah the standard deduction for moisture in unsmoked sheet is 5 per cent.

At Kuala Kangsar the standard deduction for moisture in unsmoked sheet is 10 per cent.

No purchases at Batu Pahat and Kuala Kangsar on 2nd December, and at Kuala Pilah on 3rd December.

Palm Oil.—The following prices for the local commodity were quoted during January, and indicate very clearly the recent considerable improvement in this market.

Table II.
Prices of Palm Oil and Palm Kernels.

Date 1935.	Palm Oil in Bulk, c.i.f. landed weight Liverpool/ Halifax.	Palm Kernels, c.i.f. landed weight London/ Continent
	per ton	per ton
Jan. 4	£ 16. 10. 0	£ 7. 0. 0
„ 11	18. 10. 0	7. 12. 6
„ 18	19. 10. 0	8. 10. 0
„ 25	20. 0. 0	9. 0. 0

Copra.—The spectacular rise in the value of this commodity was the outstanding feature of the Singapore market in January. The improvement had commenced in December, and, opening at \$3.30 per picul, the sun-dried grade rose to \$5.45 on the 22nd January. This peak figure was, however, only maintained for two days, the price slumping to \$4.25 but hardening again to close at \$4.40 with an average of \$4.21 per picul for the month. The mixed quality moved in sympathy with the better grade and reached a peak of \$5.10, averaging \$3.91 for the month. The December average prices per picul were \$3.16 and \$2.91 respectively.

Copra cake improved in sympathy with copra and averaged \$2.25 per picul as compared with \$1.70 in December.

Rice.—The average wholesale prices of rice per picul in Singapore during December 1934 were as follows:—Siam No. 2 (ordinary) \$2.95, Rangoon No. 1 \$2.86, Saigon No. 1 (long grain) \$2.95, as compared with \$2.96, \$2.95 and \$2.92 in November. Corresponding prices in December 1933 were: \$3.18, \$3.11 and \$2.77 respectively.

The average retail market prices in cents per gantang of No. 2 Siam rice in December were:—Singapore 22, Penang 20, Malacca 22, as compared with 24, 20 and 24 respectively in November. The averages for the year 1934 were 23, 24 and 24 cents per gantang respectively, as compared with 25, 27 and 27 for 1933.

The average declared trade value of imports of rice in December was \$3.28 per picul as compared with \$3.25 in November and \$3.36 in October. The average for the year 1934 was \$3.15 as compared with \$3.40 in 1933.

Padi.—The Government Rice Mill, Bagan Serai, continued to pay \$1.50 per picul for padi but towards the end of the month it became necessary to raise the price to \$1.60 to \$1.65 per picul. The privately owned mill was reported to be paying \$1.35 per picul. At the Temerloh weekly fair \$1.75 to \$2 per picul was paid for padi for the newly opened mill. Prices per gantang varied from 5 cents to 13 cents in different parts of the country.

Tea.—Kedah tea was quoted at 11d. per lb. on the London market in December. Average London prices per lb. during December for tea consignments from other countries were as follows:—Ceylon 1s. 1.04d., Java 10.18d., Indian Northern 11.53d., Indian Southern 11.43d., Sumatra 9.43d. Prices were still on a downward trend.

Tuba Root (Derris).—A marked improvement in the demand for tuba was evident in the Singapore market during January. Prices accordingly were firmer and were advancing rapidly at the close. Good quality roots sold on rotenone content averaged \$45 per picul, and roots sold on a basis of ether extract averaged \$32.50 per picul. The December averages were \$44 and \$30 respectively.

Coffee.—There was little change in the Singapore coffee market during January. Sourabaya coffee opened at \$19.50 to \$20 per picul and after rising to \$20 to \$21, closed at 19.50 to \$20.05. Palembang coffee opened at \$13.15 per picul and closed at \$13.50, an average of \$13.48 for the month as compared with \$13 in December.

Local prices for coffee shewed further improvement, ranging according to quality from \$20 to \$34 per picul in different Districts.

Arccanuts. There was a distinct improvement in this market during January and average prices per picul for the month in Singapore were as follows:—Splits \$6 to \$6.81, Sliced \$9.75 to \$11, Red Whole \$7.25 to \$8, the price in each range depending upon quality.

The average prices per picul quoted by the Singapore Chamber of Commerce were:—Best \$7.20, Medium \$6.57, Mixed \$5.84.

Gambier.—The price of Block again weakened in Singapore during January, closing at \$5.00 per picul to average \$5.44 for the month. No. 1 Cube retained its improved price but weakened slightly at the close, averaging \$11.88 per picul. The average prices per picul for December were \$6.15 and \$11.60 respectively.

Pineapples.—Prices in Singapore rose steadily during January on increased buying enquiry, but the volume of business passing was somewhat under normal. Average prices per case were:—Cubes \$3.29, Sliced Flat \$3.14, Sliced Tall \$3.35. December average prices were: \$3.07, \$2.95 and \$3.32 respectively.

Local average prices of fresh fruit per 100 were:—Singapore, \$3.25 and \$2.50 for large and small size respectively; Johore, 1st quality \$2.50 to \$2.90, 2nd quality \$2 to \$2.50, 3rd quality \$1 to \$2; Selangor, 70 cents to \$6 according to quality.

Tapioca.—There was again no change in the Singapore market, and prices during January remained at the level of the previous two months: Flake Fair \$3.50 per picul, Seed Pearl \$5.50, Medium Pearl \$5.85.

Sago.—Prices in Singapore advanced during the month under keen buying enquiry but weakened at the close as supplies became freer and demand fell off. Pearl, Small Fair averaged \$3.98 per picul and Flour, Sarawak Fair averaged \$2.55 per picul. December average prices were \$3.70 and \$2.31 respectively.

Mace.—Siouw continued unchanged during January at \$90 per picul, but Amboina advanced from \$60 to \$70 per picul, to average \$67.50 for the month.

Nutmegs.—The Singapore market continued unchanged throughout the month at the December closing prices. Average prices per picul were:—110's \$25.50, and 80's \$26, as compared with \$25.60 and \$26.20 in December.

Pepper.—Prices in Singapore weakened during the month in sympathy with London and on slower demand. Average prices per picul were:—Singapore Black \$20.38, Singapore White \$62, Muntok White \$64, as compared with \$20.60, \$63.60 and \$65.60 in December.

Cloves.—Prices remained nominal in Singapore at Zanzibar \$35 and Amboina \$45 per picul.

Tobacco.—There was again considerable variation in local prices. In Perak, prices per picul varied from \$30 to \$65 for 1st quality, \$30 to \$55 for 2nd quality, \$10 to \$45 for 3rd quality. Java tobacco was quoted at \$40 to \$85 per picul. Elsewhere prices ranged from \$15 to \$60 per picul.

The above prices are based on London and Singapore daily quotations for rubber; on the Singapore Chamber of Commerce Weekly Reports for the month and on other local sources of information. Palm oil reports are kindly supplied by Messrs. Guthrie & Co. Ltd., Kuala Lumpur; the Singapore prices for coffee and arecanuts by the Lianqui Trading Company of Singapore, and tuba prices by Messrs. Mackay & Co., Singapore.

1 picul = 133½ lbs. The Dollar is fixed at two shillings and four pence.

Note.—The Department of Agriculture will be pleased to assist planters in finding a market for agricultural produce. Similar assistance is also offered by the Malayan Information Agency, 57, Charing Cross, London, S.W.1.

GENERAL RICE SUMMARY*

December 1934.

Malaya.—Imports into Malaya of foreign rice during December were 56,896 tons and exports 17,011 tons, net imports being 39,885 tons. Net imports for the year 1934 amounted to 453,229 tons, an increase of 4.4 per cent. as compared with 433,956 tons for the year 1933†.

Of the December imports 49 per cent. were consigned to Singapore, 16 per cent. to Penang, 5 per cent. to Malacca, 23 per cent. to the Federated Malay States and 7 per cent. to the Unfederated Malay States. Of the total, 73 per cent. came from Siam, 25 per cent. from Burma, 1 per cent. from French Indo-China and 1 per cent. from other countries.

Of the exports during December, 74 per cent. were shipped to the Netherlands Indies and 26 per cent. to other countries. The various kinds of rice exported were:—Siam 11,027 tons (64.8 per cent.), Burma 4,444 tons (26.1 per cent.), French Indo-China 449 tons (2.7 per cent.), India 957 tons (5.6 per cent.), local production 134 tons (0.8 per cent.).

India and Burma.—Foreign exports for the period January to November 1934 totalled 1,327,000 tons, a decrease of 24.5 per cent. as compared with 1,758,000 tons in 1933.

Total exports from Burma of rice and bran from the 1st January to 1st December, 1934, amounted to 3,630,041 metric tons as against 3,178,423 metric tons in 1933.

There is reported to be a decrease of about 2 per cent. in the total area under rice in India for the season 1934-35, and a decrease of 0.7 per cent. in the area likely to mature in Burma as compared with the season 1933-34.

Siam.—Exports of rice from Bangkok during November were 196,146 tons, making a total of 1,725,143 tons for the eleven months, as compared with 1,472,268 in 1933.

The official Second Report on the Rice Crop of Siam states that there was an increase of 3.5 per cent. in the area planted in sixty provinces at the end of October as compared with 1933: the area damaged increased by 34.8 per cent.

Japan.—No further information is available since the November summary.

French Indo-China.—Entries of padi into Cholon for the year 1934 totalled 1,581,481 metric tons, an increase of 45.7 per cent. as compared with 1,085,672 metric tons for the year 1933.

Exports of rice for the year 1934 were 1,575,539 metric tons, an increase of 29 per cent.

The Netherlands Indies.—According to the *Economic Bulletin* dated 17th December 1934, there was a decrease of 2.6 per cent. in the area of rice harvested in Java and Madura during the period January to September 1934.

* Abridged from the Rice Summary for December, 1934, compiled by the Department of Statistics, Straits Settlements and Federated Malay States.

† It is to be understood throughout the summary that all comparisons and percentage increases or decreases are in relation to the corresponding period of 1933.

Imports of rice for this period totalled 158,271 metric tons a decrease of 46.8 per cent. as compared with imports of 297,046 metric tons in 1933.

Ceylon.—Imports for the year 1934 totalled 477,631 tons as compared with 439,893 tons in 1933, an increase of 8.6 per cent.

Of the 1934 imports 14.2 per cent. were from British India, 61.5 per cent. from Burma and 24.3 per cent. from other countries.

Europe and America.—Shipments to Europe from the East for the period 1st January to 20th December, 1934, totalled 1,172,063 tons, as compared with 1,233,493 tons in 1933, a decrease of 5.0 per cent.

Of the 1934 shipments 33 per cent. were from Burma, 4 per cent. from Japan, 51 per cent. from Saigon, 10 per cent. from Siam and 2 per cent. from Bengal. The 1933 percentages were 46, 2, 44, 7 and 1 respectively.

Shipments from the East to the Levant for the period 1st January to 17th November 1934 totalled 28,274 tons, an increase of 17.8 per cent. as compared with 23,993 tons in 1933.

Shipments to the West Indies and America from 1st January to 21st November 1934 amounted to 181,691 tons, an increase of 15.3 per cent. as compared with 157,543 tons in 1933.

THE NETHERLANDS INDIES RUBBER STATISTICS.

THE FOLLOWING INFORMATION HAS BEEN RECEIVED FROM THE CHIEF
OF THE CENTRAL BUREAU OF STATISTICS, BATAVIA.

Production on Estates converted to long tons of 2,240 lbs. dry weight

Territory.	Total 1933	December 1934	January to May inclusive 1934	June to December inclusive 1934	Total January to December inclusive 1934 (4) + (5)
(1)	(2)	(3)	(4)	(5)	(6)
Java ...	71,827	6,431	35,734	41,695	77,429
Outer Provinces ...	94,457	9,441	42,598	62,097	104,695
Total Netherlands Indies ...	166,284	15,872	78,332	103,792	182,124

Notes:—This is an estimate of total production of all estates (i.e. excluding native production), based upon monthly records of nearly 96 per cent. of all estates.

THE NETHERLANDS INDIES RUBBER STATISTICS.

THE FOLLOWING INFORMATION HAS BEEN RECEIVED FROM THE CHIEF OF THE CENTRAL BUREAU OF STATISTICS, BATAVIA.
ACREAGES OF TAPPALE RUBBER NOT TAPPED ON RUBBER ESTATES, FOR THE MONTH ENDING 31ST DECEMBER, 1934.

Area	Acreage of Tappable Rubber end December, 1934	Acreages of tappable rubber not tapped				Area of Tappable Rubber never been tapped		Total (3) + (5)	Percentage of (9) to (2)
		On estates which have entirely ceased tapping		On estates which have partly ceased tapping		Acreage	Percentage of (7) to (2)		
		Acreage (5)	Percentage of (3) to (2) (4)	Acreage (3)	Percentage of (5) to (2) (6)				
						(7)	(8)			(9)	(10)
(1)	(2)								
Java and Madura ...	480,193	23,062	4.8	36,512	7.6	32,740	6.8	59,574	12.4
Outer Provinces ...	744,478	37,038	5.0	116,233	15.6	98,795	13.3	153,271	20.6
Total Netherlands Indies ...	1,224,671	60,100	4.9	152,745	12.5	131,535	10.7	212,845	17.4

Notes:—1. The above acreages are converted from hectares at 2.47 acres.

2. The figures for the acreages of tappable rubber have been revised.

MALAYAN AGRICULTURAL EXPORTS, DECEMBER, 1934.

PRODUCT.	Net Export in Tons.			
	December 1933.	December 1934.	Year 1933	Year 1934.
Arecanuts ...	670	1,560	20,756	18,882
Coconuts, fresh † ...	6,507†	11,039†	100,609†	100,826†
Coconut oil ...	1,419	2,347	17,568	25,485
Copra ...	13,577	8,925	110,543	95,618
Gambier, all kinds ...	266	144	2,560	2,170
Oil cakes ...	903	676	9,992	11,273
Palm kernels ...	170	425	1,983	3,196
Palm oil ...	1,635	797	12,101	15,852
Pineapples canned ...	5,242	4,840	59,582	66,633
Rubber ¶ ...	45,205¶	52,500¶	459,836¶	479,371¶
Sago,—flour ...	1,614	1,944	7,648	10,503
" —pearl ...	369	1,683	2,646	6,177
" —raw ...	503*	753*	4,420*	7,079*
Tapioca,—flake ...	696	169	9,881	5,761
" —flour ...	332*	56*	702*	1,842*
" —pearl ...	1,050	1,425	17,297	15,770
Tuba root ...	71½	20	569½	481

† hundreds in number.

* net imports.

¶ production.

MALAYAN PRODUCTION IN TONS OF PALM OIL AND KERNELS
4th. Quarter, 1934.

(As declared by Estates)

	Palm Oil		Palm Kernels	
	F.M.S.	Johore	F.M.S.	Johore
October ...	1302.3	368.4	195.9	54.9
November ...	1266.9	450.3	178.4	75.1
December ...	1125.2	404.5	152.0	58.1
Total ...	3694.4	1223.2	526.3	188.1
Total for year ...	12,963	4,510	2,013	795

MALAYA RUBBER STATISTICS

ACRES OF TAPABLE RUBBER NOT TAPPED ON ESTATES OF 100 ACRES AND OVER, FOR THE MONTH ENDING 31st DECEMBER, 1934.

STATE OR TERRITORY	ACREAGE OF Tapable Rubber end 1933 (a)	ESTATES WHICH HAVE ENTIRELY CEASED TAPPING		ESTATES WHICH HAVE PARTLY CEASED TAPPING (a)		AREA OF TAPABLE RUBBER NEVER BEEN TAPPED		Percentage of (9) to (2)
		Acreage (3)	Percentage of (3) to (2) (4)	Acreage (5)	Percentage of (5) to (2) (6)	Acreage (7)	Percentage of (7) to (2) (8)	
(1)	(2)							(9)
STRAITS SETTLEMENTS :—								
Province Wellesley	44,285	1,129	2.5	7,333	16.6	567	1.3	8,462
Dindings	7,368	360	4.9	790	10.7	114	1.5	1,150
Malacca	121,152	135	0.1	13,454	11.1	2,448	1.9	13,589
Penang	1,366	126	9.2	299	21.9	114	8.3	425
Singapore Island	28,842	2,079	7.2	5,373	18.6	615	2.1	7,452
Total S.S.	203,013	3,829	1.9	27,249	13.4	3,758	1.9	31,078
FEDERATED MALAY STATES :—								
Perak	253,227	2,249	0.9	32,058	12.6	14,781	5.8	34,307
Selangor	310,003	3,772	1.2	35,118	11.3	11,241	3.6	38,890
Negri Sembilan	233,592	4,780	2.0	27,855	11.9	15,012	6.4	32,635
Pahang	46,712	3,772	8.0	15,366	32.9	10,359	22.2	19,138
Total F.M.S.	843,534	14,573	1.7	110,397	13.1	51,403	6.1	124,970
UNFEDERATED MALAY STATES :—								
Johore	365,400	8,237	2.2	22,123	6.1	19,309	5.0	30,360
Kedah (b)	120,588	1,798	1.4	28,886	22.8	19,591	15.5	30,684
Kelantan	25,793	5,176	20.1	2,236	8.7	5,084	19.7	7,432
Trengganu (b)	4,543	NH	NH	48	2.2	98	2.2	98
Perlis (c)	1,181	NH	NH	543	46.0	NH	NH	543
Total U.M.S.	523,505	15,211	2.9	53,906	10.3	44,082	8.4	69,117
Total MALAYA	1,570,052	33,613	2.1	191,532	12.2	99,243	6.3	225,165
								14.3

Notes :—(a) Area out of tapping on Estates which have partly ceased tapping refers to areas definitely being rested and excludes areas on any tapping round.

(b) Registered Companies only.

(c) Restored quarterly.

(d) Figures are as reported by estate managers.

MALAYA RUBBER STATISTICS
TABLE I
STOCKS, PRODUCTION, IMPORTS AND EXPORTS OF RUBBER, INCLUDING LATEX, CONCENTRATED LATEX AND REVERTEX,
FOR THE MONTH OF DECEMBER, 1934, IN DRY TONS.

State or Territory	Stocks at beginning of month 1		Production by Estates of 100 acres and over		Imports		Exports including re-exports		Stocks at end of month	
	Ports	Dealers	Estates of 100 acres and over	January to Dec. inclusive 1934	January to Dec. inclusive 1934	January to Dec. inclusive 1934	January to Dec. inclusive 1934	January to Dec. inclusive 1934	Ports	Dealers
MALAY STATES :-	2	8	4	5	7	8	9	10	11	12
Federated Malay States
Penang
Kedah
Perlis
Kelantan
Trengganu
Total Malay States
SEMPAHS :-
Malacca
Province Wellesley
Dindings
Penang
Singapore
Total Straits Settlements
TOTAL MALAYA

TABLE II
DEALERS' STOCKS IN DRY TONS 3

Class of Rubber	Fede- Malay States		Pro- Penang		Pro- Penang		Pro- Penang		Pro- Penang	
	21	22	23	24	25	26	27	28	29	30
DRY RUBBER	6,031	35,574	10,430	5,391	1,413	165	...	...	...	...
WET RUBBER	1,571	3,826	1,431	298	578	97	...	...	...	...
TOTAL	7,602	39,400	11,861	5,684	1,991	262	...	...	...	...

TABLE III
FOREIGN EXPORTS

Ports	For month		For month		For month	
	1934	1935	1934	1935	1934	1935
Singapore	37	38	39	40	41	42
Penang	...	...	...	...	...	...
Port Swettenham	...	...	...	...	...	...
Malacca	...	...	...	...	...	...

TABLE IV
DOMESTIC EXPORTS 4

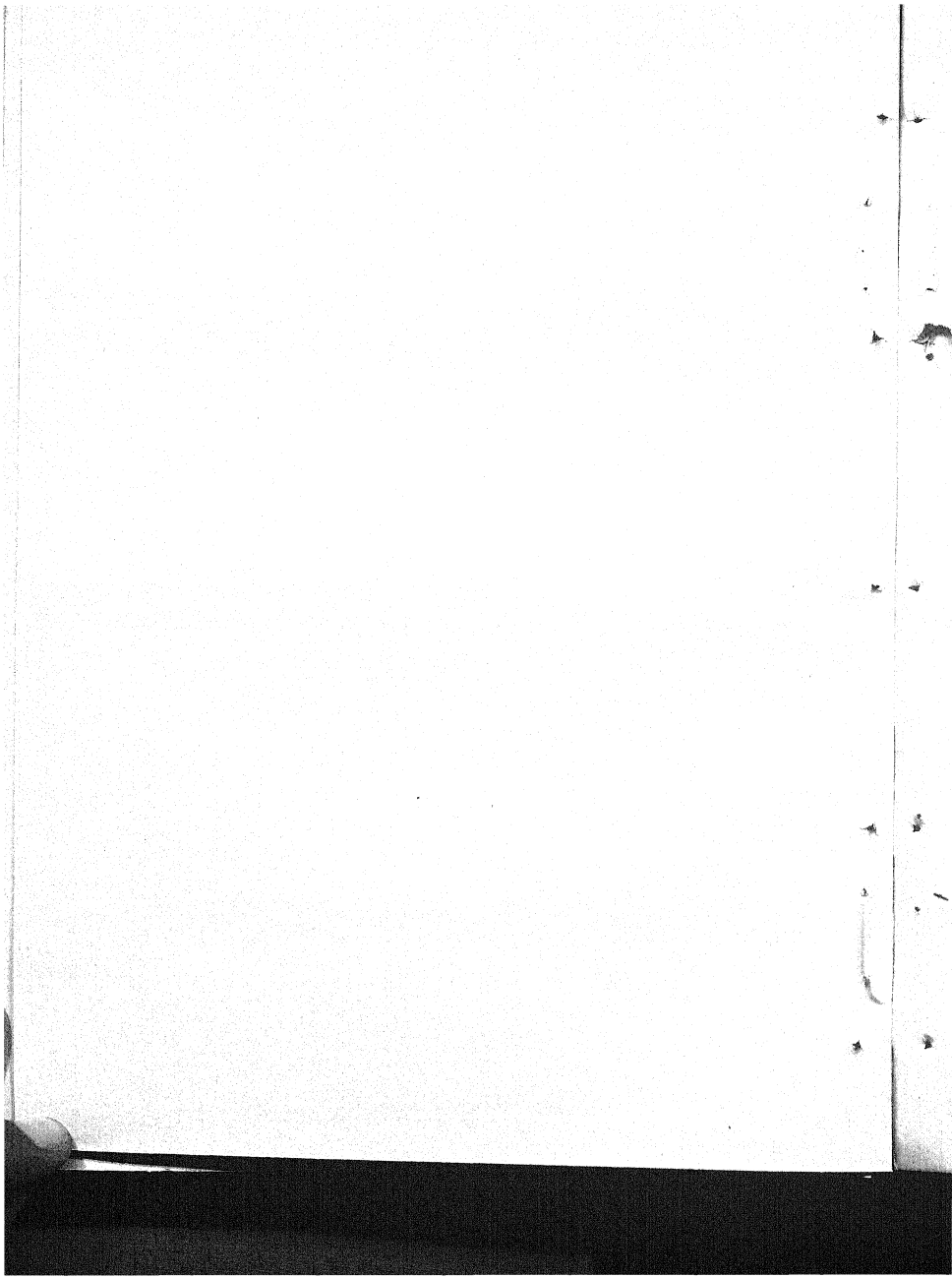
Area	For month		For month		For month	
	1934	1935	1934	1935	1934	1935
Malay States
Straits Settlements
MALAYA

- Notes:— 1. Stocks on estates of less than 100 acres and stocks in transit on rail, road or local steamers are not ascertained.
2. The stocks on estates of 100 acres and over are ascertained by the Rubber Surveyors' Office. Stocks at beginning of month = Stocks at end of month + Exports - Imports + Consumption. For the Straits Settlements, Column (9) = Columns (15) + (16) + (17) + (18) + (19) + (20) + (21) + (22) + (23) + (24) + (25) + (26) + (27) + (28) + (29) + (30) + (31) + (32).
3. For the Straits Settlements, Column (9) = figures for Singapore and Penang Islands represent sales or exports as shown by bills of lading and for the mainland represent as previously purchased by dealers from local estates of less than 100 acres.
4. Dealers' stocks in the Federated Malay States are reduced to dry weight by the following fraction: unsmoked sheet, 15%; wet sheet, 25%; scrap, lump, etc., 40%. Stocks elsewhere are in dry weight as reported by the dealers themselves.
5. Column (32) represents net exports in the absence of any means of calculating domestic exports of the Straits Settlements for the period January to May inclusive. Column (32) includes from June inclusive 243,972 tons rubber debitable to quota under the Rubber Regulation Agreement dated 7th May, 1934. (Figures may be subject to minor adjustment).
6. The above, with certain omissions, is the Report published by the Registrar-General of Statistics, S.S. and F.M.S., at Singapore on 24 January, 1935.

METEOROLOGICAL SUMMARY, MALAYA, DECEMBER, 1934.

LOCALITY.	AIR TEMPERATURE IN DEGREES FAHRENHEIT										EARTH TEMPERATURE		RAINFALL						BRIGHT SUNSHINE.				
	Means of			Absolute Extremes						At 1 foot	At 4 feet	Total.			Number of days.			Total.	Daily Mean.	Per cent.			
	A.	B.	Min.	°F	°F	°F	°F	Lowest.	Min.	Lowest.	Max.	Highest.	Min.	Highest.	Thunder-storm.	Precipitation, 0.1 in or more.	Precipitation, 0.1 in or more.	Thunder-storm.	Precipitation, 0.1 in or more.	Precipitation, 0.1 in or more.	Hrs.	Hrs.	Hrs.
	°F	°F	°F	°F	°F	°F	°F	°F	°F	°F	in.	mm.	Amt.	Most in a day.									
Railway Hill, Kuala Lumpur, Selangor	89.4	71.0	80.2	93	67	82	74	83.0	83.9	°F	in.	mm.	Amt.	Most in a day.	4	10	14	1	4	179.90	5.80	49	
Bukit Jeram, Selangor	87.3	71.4	79.3	91	68	81	74	83.9	84.2	°F	in.	mm.	Amt.	Most in a day.	1	10	13	1	1	230.05	7.42	62	
Sitiawan, Perak	88.5	71.7	80.1	91	67	85	75	83.2	84.3	°F	in.	mm.	Amt.	Most in a day.	6	13	13	6	6	211.85	6.83	57	
Temerloh, Pahang	86.8	70.5	78.7	92	65	79	74	83.1	84.7	°F	in.	mm.	Amt.	Most in a day.	11	13	26.06	11	11	218.10	7.03	59	
Kuala Lipis, Pahang	85.7	69.6	77.7	90	66	78	73	81.7	83.1	°F	in.	mm.	Amt.	Most in a day.	8	13	186.2	19	19	200.90	6.48	54	
Kuala Pahang, Pahang	83.0	73.5	78.3	86	69	79	77	82.6	83.6	°F	in.	mm.	Amt.	Most in a day.	1	19	105.9	1	1	234.35	7.56	64	
Kallang Aerodrome, Spore	86.0	73.8	79.9	89	71	80	76	79.9	81.4	°F	in.	mm.	Amt.	Most in a day.	11	14	83.3	11	11	187.70	6.05	50	
Butterworth, Province Wellesley	87.0	71.5	79.2	89	68	81	75	82.9	84.0	°F	in.	mm.	Amt.	Most in a day.	6	7	62.5	6	6	282.60	9.12	77	
Bukit China, Malacca	85.5	72.8	79.1	89	70	78	75	81.7	82.3	°F	in.	mm.	Amt.	Most in a day.	7	9	89.7	7	7	223.00	7.19	60	
Kluang, Johore	87.5	70.4	78.9	94	66	79	73	80.3	81.5	°F	in.	mm.	Amt.	Most in a day.	8	10	66.1	3	3	204.25	6.59	55	
Bukit Lalang, Mersing, Johore	82.4	72.4	77.4	86	68	77	77	79.0	79.8	°F	in.	mm.	Amt.	Most in a day.	10	13	248.2	1	1	212.50	6.85	57	
Alor Star, Kedah	87.7	68.8	78.3	91	63	82	73	82.0	84.2	°F	in.	mm.	Amt.	Most in a day.	4	6	42.4	3	3	271.95	8.77	74	
Kota Bharu, Kelantan	83.5	70.2	76.9	90	66	78	74	79.6	82.4	°F	in.	mm.	Amt.	Most in a day.	18	13	239.0	1	1	220.40	7.11	60	
Kuala Trengganu, Trengganu HILL STATIONS.	82.9	70.7	76.8	87	67	77	74	79.2	81.3	°F	in.	mm.	Amt.	Most in a day.	11	20	191.0	15	15	210.10	6.78	57	
Fraser's Hill, Pahang 4268 ft.	69.7	59.7	64.7	75	53	62	63	70.0	71.0	°F	in.	mm.	Amt.	Most in a day.	15	19	138.3	15	15	128.50	4.15	35	
Pahang Highlands, Tanah Cameron	70.5	54.8	62.7	74	47	66	61	68.2	68.9	°F	in.	mm.	Amt.	Most in a day.	12	13	145.5	38	38	138.75	4.48	38	
Cameron Highlands, Rhododendron Hill, Pahang 5120 ft.	69.5	57.1	63.3	73	52	64	61	61	61	°F	in.	mm.	Amt.	Most in a day.	11	14	156.7	42	42	154.60	4.99	42	

Compiled from Returns supplied by the Meteorological Branch, Malaya.



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MARCH, 1935

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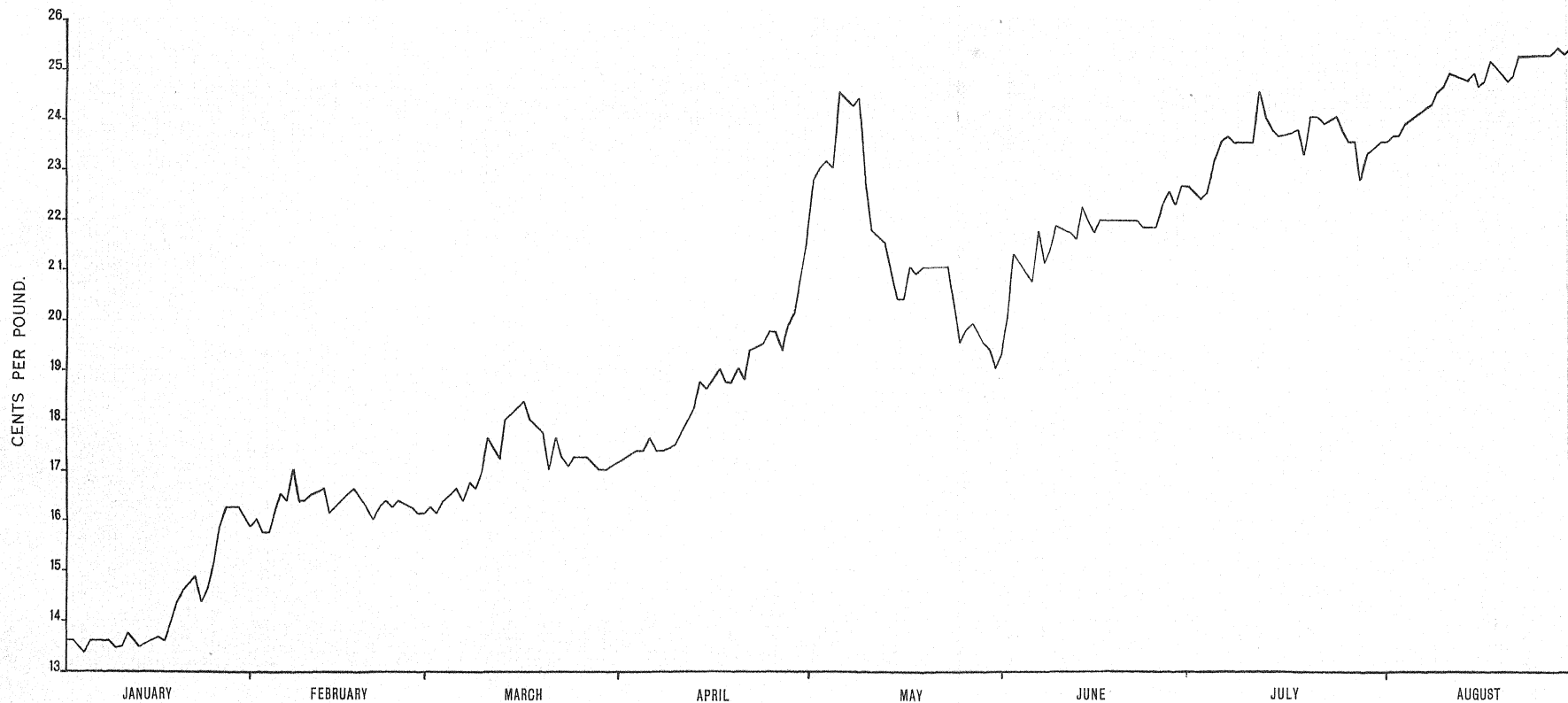
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RUBBER

SINGAPORE DAILY MARKET PRICES 1934

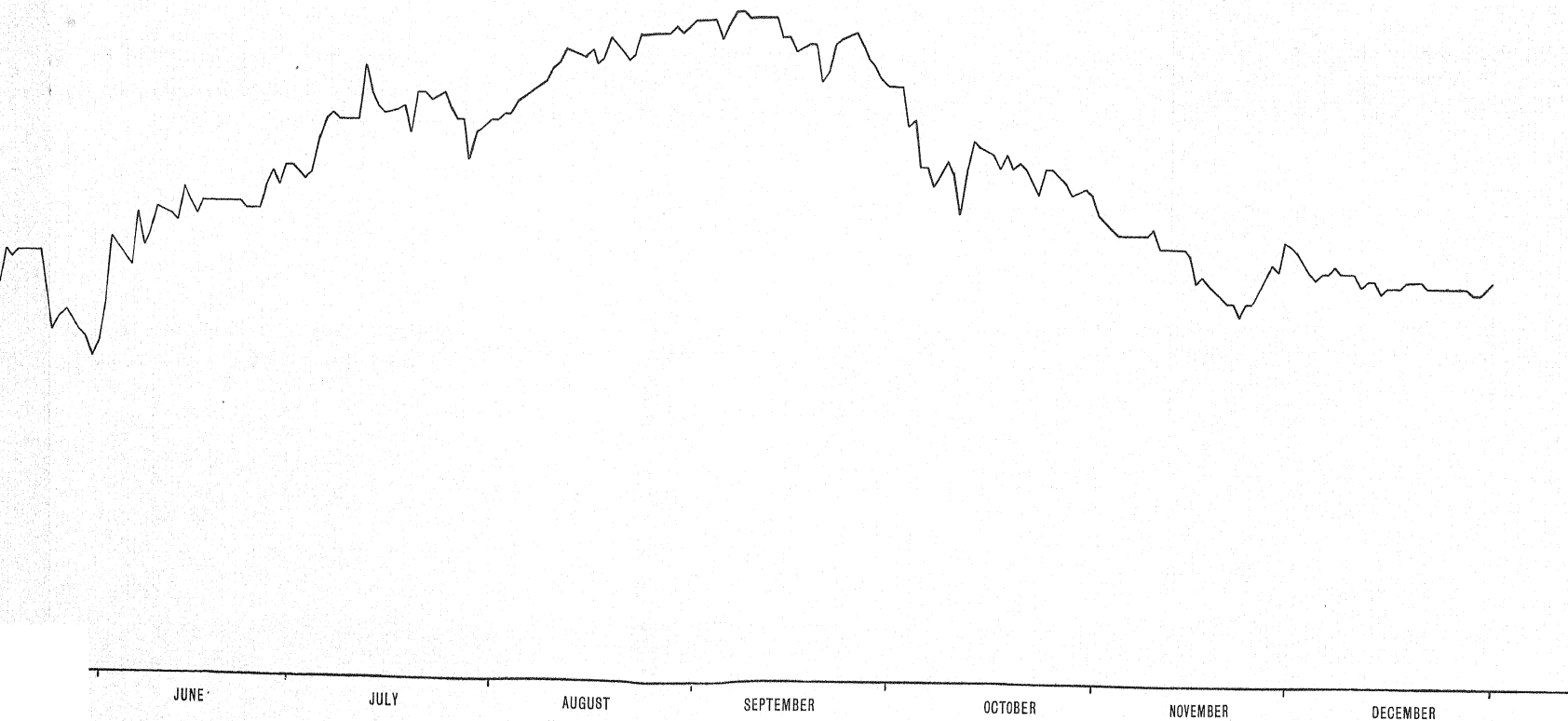


RUBBER

SINGAPORE DAILY MARKET PRICES 1934

Supplement to

The Malayan Agricultural Journal, February 1935.



JUST PUBLISHED

THE OIL PALM IN MALAYA

by

B. Bunting, C. D. V. Georgi, and J. N. Milsum.

Price: \$2 post free from the Department of Agriculture,
Kuala Lumpur, F.M.S.





THE Malayan Agricultural Journal.

MARCH, 1935.

EDITORIAL.

Fruit Production in Malaya.

One is apt to overlook or to minimise the value of the fruit industry in Malaya on account of the fact that, apart from pineapples, it is an internal trade; its extent or value, therefore, does not appear in trade returns, and it is extremely difficult to obtain sufficiently accurate statistics from which to construct a review of the position.

Two articles, however, have appeared in the pages of this Journal, summarising, as a result of exhaustive enquiries, the position of this industry in Malacca and Pahang. They give an insight into the value of the industry in these areas, the organisation which has grown up in the marketing of surplus produce—often from somewhat inaccessible holdings—and the possibilities which exist, in certain districts, for increased production.

There are, however, other areas in Malaya where fruit production is of considerable value. Evidences of this are to be found in the reports of Field Officers of the Department. For instance, it was estimated that the exports of bananas from one district in Johore to Singapore amounted to 50 tons a week. The annual value of this crop from this particular district alone would be about \$50,000. During the height of the fruit season, in another sub-district, 20,000 durians were exported to town centres daily. The value of this crop for the district in the one season probably amounted to \$50,000. Examples of this description might be multiplied, proving the value of the fruit crop, which after rubber, or coconuts in certain districts, is probably the most valued money crop amongst small-holders.

The fruit in most general use amongst Asiatics is the banana. Other fruits possibly enjoy a greater popularity, but can be obtained only during short seasons, whereas the banana is a cheap fruit and is obtainable throughout the year. There are now 23,000 acres under this crop, of which 9,000 acres are in the Federated Malay States and 13,000 acres in the State of Johore. Recent reports from the Districts indicate that the demand from the big towns is such that the prospects are favourable for extending the planted areas.

Pineapples are the only fruit exported from Malaya. The amount of canned pineapples exported in 1934 was 66,634 tons (approximately 2,073,000 cases of 48 tins each), valued at over \$7,027,000. We shall in a future number return

to the subject of the pineapple industry. Legislation has been enacted locally to ensure strict supervision of the conditions under which pineapples are canned in this country. It is hoped that agreement between growers, packers and exporters may result in the export of a more standard product which should result in the retention of the valuable markets already developed, and in the introduction of Malayan pineapples into new markets.

By the courtesy of H.M. Stationary Office, who are the holders of the Copyright, we are able to give extracts from a recent publication which summarises the present position of the pineapple markets.

The present number of this Journal is almost entirely devoted to an account of the fruits of Malaya. It has been prepared largely from the publications of the Department, some of which are out of print, while new material has been incorporated so that it presents a statement of present-day fruit production in this country.

Original Article.

MALAYAN FRUITS

Pineapples, Bananas and Miscellaneous Fruits.

Distribution.

With the exception of pineapples, fruit cultivation in Malaya is of little more than local importance. The total area in Malaya under fruit, other than pineapples, is estimated to be 61,000 acres, of which 23,000 acres are bananas. This area does not take into account the numerous small compounds surrounding Malay homesteads, in which a few fruit trees are planted and which in the aggregate amount to a very considerable area.

Although certain fruits acquire a reputation in particular localities, the distribution of the fruits is scattered throughout the country. For instance, North Johore is noted for its durians, Malacca for dukus, Penang for rambutans, but in point of fact, equally good quality fruit of these kinds can be found in other areas.

The most important centres of pineapple production at the present time are Singapore Island (9,500 acres), Johore (43,000 acres) and Selangor (8,000 acres). The total area under this crop in 1933 was about 65,000 acres, of which 21,000 acres were cultivated as a sole crop and the remainder as a catch crop, generally in conjunction with rubber.

The total area in Malaya under cultivation with bananas exceeds 23,000 acres, of which 13,000 acres are in the Unfederated Malay States (Johore 8,000 acres and Kedah 5,000 acres) and 8,750 acres in the Federated Malay States (Negri Sembilan 3,250 acres, Perak 2,500 acres, Selangor 2,000 acres). There are only 1,300 acres in the Straits Settlements, of which 700 are in Penang Island.

Of the total planted area of bananas in 1933, only about 1,300 acres were planted as a sole crop, the remainder existing as a catch crop with other forms of cultivation.

PINEAPPLES.

The Malayan pineapple canning industry was founded about 1888, when factories were opened by Europeans in Singapore. Within two or three years, ownership appears to have been transferred to the Chinese and there were at that time several small canning factories in Singapore and Penang. The latter port, as a centre of cultivation and canning of pineapples, was never of great importance, but in Singapore, the industry became well established and later extended to the State of Johore. The importance of Johore in this respect has been largely due to the development of that State for rubber cultivation with which pineapples are grown as a catch crop, and to the fact that the area of land in Singapore available and suited to the cultivation of pineapples is limited and has decreased.

The bulk of the crop is used for canning purposes. The extent of production may be seen by an examination of the official returns of exports from Malaya. The annual exports stood at an average of about 20,000 tons from 1904 till 1916. A rapid decline in the trade followed for the next three years. Thereafter, owing largely to the very considerable extension of rubber planting which took place in southern Johore, there followed a corresponding increase of the planting of pineapples as a catch crop. Consequently, exports of the canned product steadily and rapidly increased, and appear not yet to have reached their ultimate peak. The check in the upward trend of exports which occurred in 1926 and 1927 coincided with the activities of canners who formed a combine to fix prices. The lower exports in 1933 were definitely the result of the disagreement between growers and canners as a result of which many of the former destroyed part of their crop in an attempt to raise fresh fruit prices.

In addition to the cultivation of pineapples for the very important canning trade, areas exist in many parts of the country for the production of the fruit for dessert purposes. The total area planted for this purpose probably amounts to about 2,000 acres, the produce of which is consumed locally.

Varieties.

The variety most commonly grown for canning is a type of pineapple which is very similar to the "Red Jamaican" or "Spanish Pine" of the West Indies. The fruit is small, weighing from 3 to 5 lbs., and has an excellent flavour when canned. The "Mauritius", and the "Smooth Cayenne", or "Kew Pine" are chiefly grown for dessert purposes. A number of other varieties are under cultivation on an experimental scale at the Central Experiment Station at Serdang in Selangor and at the Pineapple Experiment Station, Singapore, where experiments are also being conducted on selection and breeding of pineapples with the object of improving the quality and reducing the depth of "eyes", as deep "eyes" in the fruit result in considerable waste in cutting for canning purposes.

System of Production.

Many of the owners of pineapple canning factories own land upon which they have planted pineapples. In some cases the owner undertakes the entire responsibility of planting and bringing the area into production. On the other hand, many areas are worked on a system whereby the Chinese owner arranges with a number of Chinese squatters to plant up his land with pineapples and to keep it clean for an agreed charge per acre per month. Each squatter is thus definitely and absolutely responsible for a portion of the estate, and generally erects his own temporary abode thereon. The agreement usually provides that the squatter shall get 50 per cent. of the value of the pineapples as a bonus after cartage costs have been deducted, and the agreement as a rule contains a clause which provides for the payment to the squatter of a sum of money per acre for clearing the pineapple plants from the land after five years.

Climate.

The well-distributed and heavy rainfall of Malaya renders this country particularly suitable for pineapple cultivation. The equatorial conditions are responsible for the fact that two main crops are harvested annually instead of one big crop and one small crop as occurs in latitudes further from the equator. Even in Malaya, however, the January crop is decidedly smaller than the June crop.

Soils.

Pineapples will grow on a wide range of soils, but favour the medium type of soil with good soil aeration and drainage. For this reason also, gently sloping lands are to be preferred. These conditions are met with on the majority of the inland areas, wherever topography lends itself to free natural drainage. In particular, the quartzite soils, and the granite soils are known to be suitable. Pineapples are also grown in Malaya on peat soils. In some cases, pineapples have been cultivated by Europeans on newly opened peaty land destined for rubber, less with the idea of profit from the fruit than for the favourable effect pineapple plants are said to have in improving the condition of such soils.

Until recently, it has been the custom to cultivate pineapple in Malaya either on newly-opened jungle land, on land which has been out of cultivation for a number of years, during which period it has reverted to secondary jungle conditions, or as a catch crop with rubber.

Planting Material.

Pineapple planting material is of four descriptions; *viz.*, ratoons which are formed from buds on the stem among the roots; suckers formed in the leaf axils; slips formed from buds appearing immediately below the fruit; and crown slips and crowns, formed from buds beneath and around the crown of the fruit. Ratoons and suckers are very suitable for planting purposes, as they produce fruit earlier than do the less strongly-developed slips, but slips (suckers) from buds below the fruit are used almost universally as planting material in Malaya, owing to the fact that these slips are produced in larger numbers, are uniform in size and age, and cost less to transport.

A recently introduced method of propagation originated in Trinidad has for its object the production within a short time of a large number of uniform plants of a variety*. In this method cross sections 1/5 inch in thickness are cut from the mature aerial stem and rhizome which has been stripped of its leaves, roots and scales. The sections are placed in a 5 per cent. solution of potassium permanganate for five minutes, the solution drained off and the sections air-dried for two days. The sections are then planted horizontally in boxes and kept in the shade. The dormant buds commence to grow a month

* Plant Propagation by E. A. Walters. *Tropical Agriculture* Vol. IX, No. 2, 1932.

after planting and may be transplanted to beds when two months old. When sufficiently developed, the plants are separated and planted in the field.

This method has been tried experimentally in Malaya, but it is too early to state to what extent it is adaptable under estate conditions, though for the multiplication of new or rare varieties it possesses undoubted advantages.

Planting in the Field.

In Malaya, single row planting is the usual method adopted and plants are usually spaced in the field 5 feet by $2\frac{1}{2}$ feet, with a six-foot path at every 100 feet. This spacing gives from 3,000 to 3,400 plants per acre.

Suckers, slips, and ratoons for planting are cut square at the base, the lower leaves are removed, and the planting material dried in the sun for a while before being planted.

The plants are placed from three to four inches in the ground, the actual depth depending upon the size of the plant. Care is taken that no soil or sand enters the bud as it will kill the plant, or at least retard its development.

After planting, the fields are periodically weeded, but apart from this operation, and the earthing up of the plants and removal of excess buds, no further cultivation is usually given in Malaya.

Yields.

The first crop is harvested about 18 months after planting, from 1,200 to 1,500 fruits per acre being obtained. Thereafter, for a further $3\frac{1}{2}$ to 4 years, two crops are reaped annually, *viz*: in May, June and July and in January, February and March, although a small amount of fruits are coming in all the year round. After the crop is in full bearing, the first four crops may give 4,000 to 5,000 fairly large fruits per acre, per annum, followed by three or more crops smaller in number and poorer in quality.

The economic life of the plant under Malayan conditions depends upon whether it is cultivated as a sole or as a catch crop, and even then is still open to doubt. Under sole-crop conditions present opinion is veering to a system of more frequent re-planting, and application of artificial fertilizers at regular intervals.

The fruit for canning is either sold by the growers (if they are not also owners of factories) to the canneries at the factory door, or on the road-side, and is also purchased by drivers of passing lorries at road-side for re-sale to the factories.

Catch Crop versus Sole Crop.

Until very recently the pineapple canning industry has been maintained from supplies grown as a catch crop, generally in conjunction with rubber planting. This system was worked successfully by the Chinese for a number

of years and proved most remunerative, especially at a time when the canned product commanded a much higher price than it does in the present depressed state of markets.

About the year 1930 it was realised that, if the market for Malayan pineapples, which had by then grown to some importance, was to be maintained or further developed, consideration must be given to the question of the production of the fruit as a more permanent crop. There was already an easing-off in the area of land newly planted with rubber and suitable land for development by this method was not inexhaustable. Furthermore, the Malayan Governments closed their books against further alienations of land for rubber planting and the number of alternative crops to rubber as the main crop were very limited.

It was realised that the change of policy would entail departure from the somewhat haphazard customary method of cultivation. The new system would necessitate more cultivation, manuring and consideration of closer planting distances and of rotation of crops. These questions are being studied by the Department of Agriculture in Singapore, Johore and Serdang and also by the growers. The introduction of rubber regulation, a feature of which is the prohibition of further planting of rubber has rendered the problem urgent. In 1934, one-third of the total area of pineapples in Malaya was planted as a sole crop.

Canning.

Factory methods for canning pineapples differ considerably in Malaya from those employed in other countries. Whereas in modern packing methods, machinery is used as much as possible, in Malaya, hand-labour, owing to its relative cheapness, is usual for almost all the operations. The local canning pineapple is not suitable for mechanised peeling and slicing operations, unless control of size and type of fruit is established by packers. Under Malayan conditions, factories are at no great distance from the sources of supply of the fruit, thus reducing transport costs. The preparation of the fruit for packing is done by hand-labour, and the cans are made in the factory, each factory being equipped with the necessary machinery for this purpose. This latter fact contrasts with the system adopted in competing countries of production, where the cans are purchased from a central can-making factory.

The fact that by the Malayan method, transport of fruit and empty cans is reduced to a minimum, has its advantages. Factory-produced cans are dearer than those produced in the canneries by the Chinese employees. The fruit can be harvested in a riper condition than would otherwise be possible; factory methods are such that generous use can be made of labour, which is comparatively cheap; and freight, which is comparatively expensive, is reduced to a minimum. On the other hand, the packer has but little control over the quantity or quality of his fruit supplies, which is a definite disadvantage.

The question of power must also be considered in connexion with the situation and size of the factory and of the amount of machinery employed. The factory in this country is usually of a comparatively temporary nature and in many cases situated at a distance from a cheap or convenient source of electrical supply. The usual unit is such that the power can be supplied by an engine of 30 to 40 h.p. which is sufficient for a factory turning out from 1,000 to 1,500 cases per day.

The capacities of the Malayan factories vary considerably. During the season the factory may work night and day, and it is on this basis that capacity is estimated. The largest factory can turn out about 3,000 cases of 48 tins per case per day; the average factory has a capacity of about 1,000 cases per day.

The operation of preparing the pineapples for canning needs little description. Canned pineapples are exported either as slices, cubes or crushed. Whole pines may be exported to fill a special order. Pineapple cores have recently been canned. The work is done by hand at long tiled tables, the operator, wearing suitable clothing and a rubber glove, performing the cutting operation with a knife something akin to a chopper. The waste of fruit due to peeling, coring and removal of the "eyes" is considerable; with "sliced" fruit it amounts to about 30 to 40 per cent., and with "cubes" the waste is between 60 and 70 per cent. of the fruit.

While cutting the fruit, the operator grades the product. Fully ripe fruit of good quality is put aside and is destined for export as "Golden"; the remainder, excluding very irregular pieces and very unripe fruit, is packed as G.A.Q. (good average quality). The rejects from this grade are classed as No. 2 and are sold only on the Far Eastern market.

A considerable space in the factory is devoted to the manufacture of the cans. These are made from tin-plate which is imported in sheets for the purpose.

The sheet-tin is cut into strips in a shearing machine, the strips being of convenient size for further cutting of body blanks and strip stock for tops and bottoms. The bodies are made by passing through a body forming roll, and a flanger. The bodies are then put together and soldered by hand. The tops and bottoms are stamped out and affixed to the body in a machine known as a double seamer. The tin is filled with fruit and the top fixed with a seamer. No solder is used for fixing the tops and bottoms; a thin strip of rubber is placed round the lid, which when flanged hermetically seals the can.

The cans are filled with fruit and removed to syrupeing trays, where a syrup made from cane sugar is added until the cans are completely filled. They are then removed to the seaming machines and capped.

The amount of sugar used varies with the product and the market for which it is destined. The natural sugar content of Malayan pineapples as canned is usually taken to be 11 per cent., though if the fruit is fully ripe it may be as high as 17 per cent. About 90 per cent. of the canned pineapples from Malaya are packed with the addition of cane sugar, giving a total sugar content of from 20 to 25 per cent.



The sealed cans of fruit are cooked for approximately 30 minutes at a temperature of 212°F., after which they are stored in a cooling chamber and packed for export, either labelled or without labels depending upon the specification of the particular order.

Canned pineapples are packed in cases of *serai* wood or of three-ply wood. The former is cheaper and it is stated that it is used for nearly 70 per cent. of Malayan exports.

The usual packing allows 1½ lbs. of fruit per can, forty-eight such cans being packed in a case. For a case of canned pineapples, about seventy-five fresh fruits are required.

By-Products.

Only about one-third by weight of the pineapples received in the factory is utilised. The resultant large quantity of waste is frequently a source of embarrassment, especially if the factory is within a municipal area.

The economic disposal of waste has been investigated. It is found that, as a preliminary to its disposal, pressing and grinding are necessary. Incineration of the solid portion for the production of an ash possessing valuable manurial properties has been suggested, the liquid portion being used as a source of alcohol. Pineapple bran, used as food for cattle can be prepared and has already been marketed in Hawaii. A third method of disposal is to return the partially dried residue to the field and to spread it in shallow layers.

None of these methods has been employed to any extent in Malaya. In most cases the refuse is either placed in heaps or is dumped at sea. Control of the dumping of waste is, however, exercised by Public Health Authorities.

Marketing.

Most of the canned pineapples are marketed through the European exporting firms in Singapore. Malaya is the second largest producer of canned pineapples, Hawaii taking the premier position. Malaya has captured a market for a cheap product. This was rendered possible by cheap cost of production and by low costs in the field and factory. For these reasons, it is possible for Malaya to market a product which, if not perfect as far as grade is concerned, is a canned fruit of good quality and flavour and the cheapest canned fruit in the market. For these reasons it has become the poor man's dish and has found a ready market in the United Kingdom. Improvements in grading have more recently resulted in an extended market in other countries.

The distribution of exports from Malaya in 1933 was as follows :—
United Kingdom 45,806 tons, valued at \$4,746,949, Canada 6,241 tons, valued at \$665,935, the continent of Europe 4,032 tons, valued at \$380,674, other countries 3,502 tons valued at \$491,898. Thus, the total exports were 59,581 tons, valued at \$6,285,456, of which the United Kingdom took 77 per cent. Over 80 per cent. of the canned pineapples consumed in the United Kingdom is the product of Malaya.

The export value of pineapples has varied considerably in recent years. Between 1904 and 1918 the average was \$4.73 per case; in 1919 it averaged \$12.84, and in 1920, \$16.30; thereafter the export value dropped steadily.

Actual market prices per case in Singapore in the past two years for the recognised grades were as follows:—

	Cubes	Sliced (flat tins)	Sliced (tall tins)
	\$	\$	\$
1932	3.34	3.27	3.48
1933	3.11	3.00	3.19

Improvement of the Industry.

Acting on the recommendation of a Singapore Conference which reported to the Governments concerned early in the year 1931, efforts are being made to improve the industry; in the field, by investigating the cultivation of the crop, and improving the varieties grown for canning purposes; in the factory, by closer control of the factory conditions, and by the introduction of a grading scheme. Legislation now provides for the registration of all factories, the marking of cans to provide a means of identifying the factory from which they originated and the enforcement of hygienic conditions in factories. It is hoped that, in the near future, agreement in the trade will be reached for the introduction of a scheme of grading and inspection.

The Malayan canned pineapple has gained for itself an enviable reputation on the world's market as a cheap and good canned fruit at a low price. Provided that supplies can be maintained and that the improvements made in quality do not result in material increase in cost of production, the market for the Malayan product should be considerably increased in the next few years.

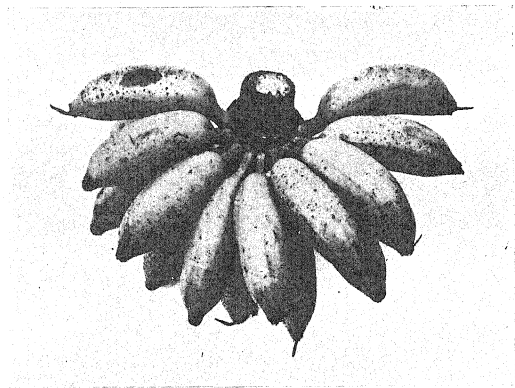
BANANAS.

Bananas are cultivated generally throughout Malaya, almost every small homestead having a few plants to supply fruit for home consumption. Being an article of general diet amongst Asiatics, a large number of varieties have become evolved, many of which are of a coarse nature, and are only eaten cooked. Amongst the better known cooking varieties are Pisang abu, a banana covered with a waxy "bloom"; Awak betul with a yellow, spotted skin; Awak legor, a tall variety with a yellow-skinned blotchy fruit which contains numerous seeds; Nangka, a variety producing a large fruit with a distinctive smell; Talon, a large fruit with yellow skin, flesh cream, soft and sweet and Tandok with a giant-sized fruit, exceeding a foot in length.

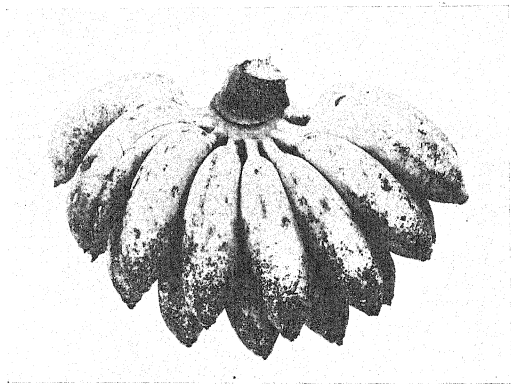
The dessert varieties are deserving of closer description by reason of the greater demand which exists for such varieties and the large area devoted to their production.

The chief commercial varieties cultivated in Malaya are Pisang Embun, P. Mas and P. Rastali.

PRINCIPAL VARIETIES OF MALAYAN BANANAS.

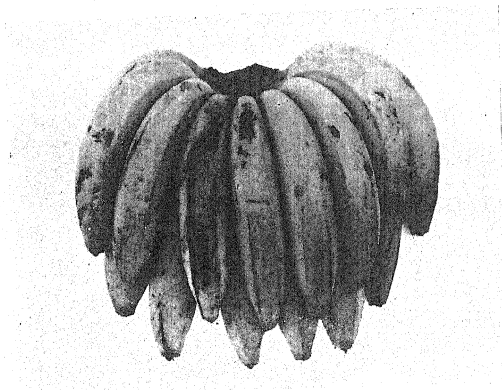


Mas.

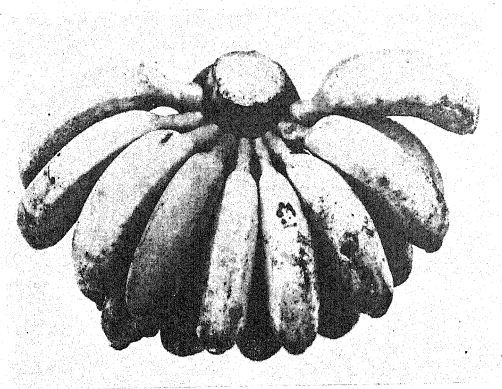


RASTALI.

PRINCIPAL VARIETIES OF MALAYAN BANANAS.



EMBON.



RAJAH.

Pisang Embun, known also as P. Medji and P. Bunga, is considered to be identical with the Gros Michel or Jamaica banana. The plant is about 15 feet high, having pseudo-stems usually mottled with black markings; hands 8 to 9, fingers 15 to 17 per hand; fruit $6\frac{1}{2}$ to 8 inches long, $1\frac{1}{2}$ inches wide. The hands are evenly spaced and the fingers are large, well-filled, curved and of uniform thickness.

This is the best banana so far established and is excellent for dessert.

Pisang Mas.—The plant is of dwarf habit with pseudo-stems and petioles yellowish-green in colour; fruit 3 inches long $1\frac{1}{4}$ to $1\frac{1}{2}$ inches broad. The skin is thin, often adhering to the flesh, which is a rich golden yellow, soft and sweet and somewhat "greasy". It is cultivated very extensively in some areas by Chinese and always commands a higher price than other varieties. The unsatisfactory features of this variety are that the fruit is very liable to bruising and is of a bad shape for transport.

Pisang Rastali.—The plant attains a height of 10 to 12 feet. The stems are dark green with chocolate markings. Bunch is $3\frac{1}{2}$ feet long with 8 to 9 hands; fingers about 12 per hand; fruit 4 to 5 inches long, $1\frac{1}{2}$ inches broad; skin yellow, rapidly becoming brown as it matures. The flesh is light yellow with a pleasant sub-acid flavour, which improves after keeping for several days. Although a popular variety, the skin is too thin and darkens too rapidly for it to be transported any distance.

Other well-known varieties of dessert bananas are Berangan, which is also made into flour when immature; Boyan with a white flesh, which adheres to the skin; the fruit is apt to fall from the bunch when ripe. Brok bakul, a plump fruit, a heavy yielder and of good flavour; Jari Buaya with a fruit prominently ridged; Kapas; Kelat, with a spotted fruit skin. Laing with a large fruit, skin reddish-yellow, flesh white, stiff and of good flavour; and Lilin, a variety popular amongst Asiatics, but rarely seen in the markets. Pisang Masak Hijau closely resembles Embun. The fruit is yellowish green when ripe, flesh soft and pleasant flavour. Fruits fall away from the hand when ripe and differ in this respect from Embun.

Pisang Rajah is a rather coarse-fleshed variety, popular in Java but less popular in Malaya. Raja Udang, a good quality banana with a dark red-brown fruit skin, is unpopular owing to the belief that it causes skin disease. Pisang Sa-ribu, not suitable for dessert purposes, is a very small fruit, as many as 1,500 fruits being produced per bunch. Pisang Serendah is a distinct variety, being a form of *Musa Cavendishii*, the Chinese or Canary banana. The plant is of dwarf habit; hands 3 to 4 with 14 to 16 fingers per hand; fruit medium size, greenish-yellowish when mature; flesh soft and of excellent flavour. Pisang Susu is a plant about 9 feet high, producing bunches $2\frac{1}{2}$ feet long with 7 hands, fingers 10 per hand. Fruit is 5 inches long and $1\frac{1}{4}$ to $1\frac{1}{2}$ inches broad, yellow in colour. The flesh is light yellow.

Cultivation.

The banana flourishes best on heavy soils fairly rich in organic matter, and in moist situations, provided that the soil is well-drained. The plant is liable to be damaged by heavy winds and should not be planted in exposed situations.

The cultural requirements of this crop are simple, provided that the soil is sufficiently fertile, of good depth and well drained. Propagation is effected by off-shoots or suckers, which are planted at distances of from 10 to 15 feet apart according to the habit of the variety. Large holes are opened and partly filled with a quantity of well-rotted cattle manure. The first bunch of fruits is usually produced at about one year from planting. After removing the fruit, the stem is cut down to allow the young suckers to expand. At this stage the clumps are mounded up with a mixture of trash and manure. The subsidiary stems produce fruit when from 12 to 16 months old and the plants continue to be productive for about five years. Under average conditions a yield of two bunches per year may be obtained from each clump.

Pests and Diseases.

The banana areas of Malaya are comparatively free from any very serious form of disease at the present time. Panama disease, caused by the fungus *Fusarium Cubense* exists only in an endemic state in Malaya. The varieties which have proved most susceptible to Panama disease are Embun, Rastali, and to a less extent Talon. The first named is the most important commercial variety. All of these varieties shew varying degrees of susceptibility under different physiological conditions. Moisture is the most important factor with regard to the incidence of this disease, the worst outbreaks occurring during the rainy season, and during the drier weather there is much less evidence of disease symptoms.

The soil organism causing Panama disease affects the vascular tissue only and internal symptoms of disease are first apparent in the roots or cut end of the sucker and afterwards appear throughout the rhizome and eventually in the above-ground parts. A cross section taken near the base of the pseudo-stem of a diseased plant shews the cut surface with rows of yellow, orange, red or red-brown spots which mark the position of the diseased vascular bundles. The distribution of the diseased fibro-vascular bundles is usually more concentrated towards the central portion of a diseased plant and the occurrence of a central rot associated with the massed bundles is of value in distinguishing Panama disease from diseases in which the rot extends from the periphery. There may, however, even in Panama disease be no development beyond a suffused yellowing and softening of the upper part of the bulb.

Bacterial vascular diseases of the banana exist whose internal and external symptoms are very similar to the Panama disease. These bacterial diseases are Blood disease, caused by *Pseudomonas celebensis* and the Javanese Vascular

disease caused by *Pseudomonas musae*. These diseases are met with fairly commonly in the Netherlands Indies but have not yet been found in Malaya. The external symptoms peculiar to Blood disease are:—(1) the yellow stripe effect on the leaves; (2) the particular discoloration occurring on the fruits. In the case of the Javanese Vascular disease, the typical symptom is the diminutive size of the heart of the crown.

Periodical outbreaks of the insect pest known as the leaf-roller (*Erionata thrax* L.) occur in most banana areas and often with quite serious results. The defoliation effect is usually sufficiently severe to cause the production of inferior fruit bunches. These outbreaks are largely influenced by the prevailing weather conditions. Dry periods appear to be the most favourable for the spread of this pest. All of the cultivated varieties appear to be equally susceptible to attacks by this insect. The two wild varieties, *Musa violescens* and *Musa malaccensis*, are not affected.

The banana weevil borer (*Cosmopolites sordidus*) does the greatest amount of damage in areas where there are poor soil conditions. In connexion with Panama disease, it has been suggested that the weevil-borer may be an important accessory factor as regards acting as a wounding agency. Experiments in this country have shewn that when Panama disease exists in a particularly endemic and virulent form, the weevil-borer seldom acts as an accessory factor in the spread of this disease. Inoculation experiments also shew that the weevil-borer enters into the rhizome of a sucker after Panama disease has established itself.

Products.

The entire Malayan banana crop is consumed locally.

Fairly extensive areas under the crop exist in Johore from which centre Singapore is largely supplied. Areas in Negri Sembilan supply the large towns of Kuala Lumpur and Seremban.

Banana flour has been prepared in Malaya for export. The quantities exported have been negligible. For the preparation of banana flour, the fruit is peeled, sliced thinly and sun-dried. The dried slices are crushed in a corn-mill or pounded in a mortar and sifted through fine muslin. As an alternative, artificial drying, preferably in vacuum dryers, is effected and results in a better-coloured product. The latter method, however, is not used in Malaya.

The Chinese use the old banana stems as a food for pigs. Although they are succulent and refreshing, their feeding value is low on account of the very small proportion of dry matter.

The preparation of fibre from the banana plant has been investigated. Although the cultivated banana yields a relatively small quantity of fibre, yet in quality it resembles the medium grades of "partially cleaned" Manila hemp.

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Prices.

The wholesale price of bananas varies in different seasons, from about 50 cents to \$1.50 per picul.

MISCELLANEOUS FRUITS.

There remains the large number of kinds of fruits scattered throughout the country, grown generally in mixed gardens, but to some extent, especially in the older Settlements of Malacca and Penang, in definite orchards of one or two kinds of fruits.

It is impossible in this place to describe all the fruits found in Malaya; they vary from the well-known cultivated fruits down to wild fruits, found in the jungle, but which are sometimes planted near centres of rural population.

Propagation.

Fruit trees may be propagated either from seed or by vegetative reproduction. The chief objection to propagation from seed is that frequently seedlings do not reproduce the desirable qualities of the parent tree; in other words, they do not breed true. Furthermore, the length of time to produce fruit is usually longer in the case of propagation from seed than it is from vegetatively-produced trees.

In raising plants from seed, the seed is usually sown in a nursery bed or in pots, bamboo baskets or boxes. In Malaya, the method of sowing in bamboo pots has gained some popularity and has much to recommend it. For this purpose, sections of bamboo stem are cut into suitable lengths, with a node forming the bottom, having a hole made for drainage. The bamboo is then filled with suitable earth, and the seed planted. There is no necessity to disturb the seedling until transplanting into the field. Should the seedlings be allowed to remain in the joints for more than a year the roots become twisted and unsatisfactory growth is obtained after transplanting.

Vegetative propagation may be effected by one of several methods. The choice of the particular method will depend upon the kind of fruit tree to which it is to be applied.

Root cuttings.—The roots of certain fruit trees such as the guava, citrus, breadfruit and wood-apple form adventitious buds, from which growing shoots with roots attached may be obtained.

Stem cuttings.—Several Malayan fruits may be successfully propagated from hardwood cuttings. The three species of *Passiflora* are readily raised from cuttings of hardened wood, a foot or so long, placed in sandy soil under shade. Other fruits that may be propagated by this method are most of the *Eugenias* and most citrus fruits. Several low-growing fruits may be propagated from cuttings. In general practice, however, only a few fruits are likely to be raised satisfactorily from cuttings.

In taking stem cuttings a clean cut is necessary. The basal end is cut close to the bud or node and all the lower leaves removed. The cutting is about a foot in length.

Cuttings are planted in sandy soil and the earth pressed well down around the stems. After roots have developed, top shade can be reduced gradually, until the young plant is sufficiently hardy to withstand ordinary climatic conditions.

Sometimes greater success may be attained by ringing the bark, or tying a piece of twine or wire around the stem before removing the cutting. This results in the formation of a swelling above the ring. The branch is then cut immediately below the ring and planted in the nursery bed.

Budding.—After much experiment, the modified Fockert Method has been adopted. In this method only a transverse cut is made in the stock, the bark being stripped down either in one or several pieces and three-quarters of the flap cut off. It has been found that the bark of the stock heals better by using this method and that a greater number of successes are obtained. Raffia grass is used as the tying material, while a rosette of leaves is usually fastened around the main stem above the bud to provide shelter from sun and rain. Preliminary success with budding has been attained with rambutan, durian, pomelo, limes and various other citrus fruits, avocado pear and guava.

Layering and marcottage.—Layering consists in rooting a branch or shoot by bending it down to the soil and partially interrupting the flow of sap from the parent tree by a cut or ligature. *Stool-layering* is the production of roots induced by drawing the surrounding soil round the base of the tree. These methods have only a restricted application in Malaya.

Marcottage is a modification of layering, but is especially adapted to many Malayan fruits, in particular the chiku, but also for raising limes, mangoes, rambutans and pulasans. A branch, about three feet long and three-quarters of an inch at its greatest diameter, is ringed with a sharp knife in two places one inch apart, and the bark from the ringed portion is removed. This portion is covered with coconut husk mixed with soil. The husk is tightly bound to the branch and kept moist. In favourable circumstances, roots will shew through the fibre in two to three months. After a further three months the branch is severed from the parent plant just below the portion operated on and planted without removal of the husk. New plants of chiku, produced in this way, frequently bear fruit in the first year, but no fruit should be allowed to set for the first two years.

Grafting.—It is probable that some of the many methods of grafting would be suitable for the propagation of fruit trees in Malaya. Information on this subject is, however, very scanty, and in the absence of definite information, no recommendation can be made. Generally, budding on seedling stocks is preferable to grafting, for under tropical conditions, difficulty is experienced in obtaining material as scions in a sufficiently dormant state.

Etiolation.—This is a system of layering, and suitable for the production of planting-stock on a large scale. The principle involved is the production of a number of shoots from the partially buried main stem and primary branches; the shoots under suitable conditions produce roots at their bases. The necessary conditions are obtained by mounding up the shoots with soil, which causes the lower portions of the stems to become etiolated or blanched. To ensure rapid root formation, the soil is then removed and a band of thin wire placed round the base of each shoot a short distance above its point of origin. The soil is then replaced and root formation occurs. Success by this method has been obtained with limes, lemons, mandarin oranges, jambu betai, chiku, rambutan, avocado pear, durian and guava.

Soils.

The best type of soil for fruit culture is usually found in the plains and valleys formed from alluvial deposits brought down from the mountains. The extensive tracts of land adjoining the large rivers of the Peninsula are ideal for the cultivation of fruit. Such soils, on account of their close and impermeable texture, require more cultivation than do the open sandy soils of the low undulating hills. Even with good drainage, unless some form of cultivation is given, the root growth is liable to be restricted and to form a close mat of surface roots. There are, however, several Malayan fruits which succeed on such land, of which the mangosteen may be cited as an example.

The low peaty lands of the coast are generally unsuited for fruit culture. Where there is a quantity of clay present, better results are possible.

Considerations, other than that of soil, generally determine the land in which small areas of fruit are grown. Fruit trees are preferably planted near the house, otherwise the fruit may be stolen. If planted near a jungle, the fruit will probably be taken by animals and birds. Many fruit trees are very ornamental in appearance and enhance the surroundings of the house if judiciously planted.

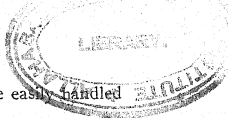
On flat land with a high water table, drainage is essential. The prevention of surface-soil erosion on hilly land must be effected by any of the recognised methods, such as terracing, pitting or the planting of cover crops.

In districts where damage is done to trees by high winds, some form of windbreak around the orchard is advisable. Windbreaks may be established by planting strong-growing trees at right angles to the direction of the prevailing winds.

Cultivation.

The large Malayan fruits, such as durians, are capable of looking after themselves, but the smaller kinds need cultivation and protection from domestic animals.

In the tropics, fruit trees are planted out when much younger than is the case in temperate climates. There being no dormant season, the trees must



be planted when in a growing condition and young trees are more easily handled and less liable to receive a check than older trees.

If the trees are to be removed from a nursery, the roots must not be disturbed more than is absolutely necessary. In planting, the trees must be planted at their previous level and the earth banked round the stems at least six inches to allow for settling, as trees cannot grow in pits.

If planted during dry weather, watering is necessary until the plants become established; but it is better to plant at the commencement of the rains, say in October or March.

Trees that are likely to be blown about by the wind require to be staked directly after planting. Some form of temporary shade is necessary until the plants are established, when it may be gradually discarded.

The land may either be clean-weeded or planted with one of the recognised cover crops. When cover crops are employed, strip or circle weeding is necessary to keep the cover crop away from the base of the fruit tree. Unless this precaution is taken, growth is considerably retarded.

The amount of cultivation will depend on local circumstances. Cultivation during dry weather is generally beneficial and mulching is recommended.

Little is known about stem and root pruning of fruit trees in Malaya. Any work in these directions, therefore, requires to be carried out with caution in the first place, until the effect is evident.

Knowledge regarding the manuring of fruit trees in Malaya is still very imperfect. It is found, however, that fruit trees respond to dressings of farmyard manure, supplemented with basic slag. A complete mixture of artificial fertilizers consisting of calcium cyanamide, basic slag and sulphate of potash, in the ratio by weight of 1:3:1 has been used with beneficial results as a general dressing at the rate of 4 lbs. per tree on avocado pear and other fruit trees. This dressing may be doubled if the trees are large.

Digging a trench round the trees at the limit of branch spread and incorporating cattle manure with such material as leaves, weeds, groundnut cake and with or without the addition of artificial fertilizers gives beneficial results. This method is similar to that successfully used by Chinese fruit growers in Malaya, but in addition to farmyard manure, or as a substitute for it, fish refuse, prawn dust and groundnut cake are often employed.

For the raising of fruit stock it has been found necessary to "bastard trench"* the land and to incorporate in it plenty of cattle manure. Basic slag is afterwards spread on the surface at the rate of 2 cwts. per acre. After the seedlings have become established, a complete mixture consisting of calcium cyanamide, basic slag and sulphate of potash, in the ratio of 2:4:1 at the rate of 2 cwts. per acre has been sprinkled between the plants and worked into the soil, followed three months later by a dressing of sulphate of ammonia at the rate of 2 cwts. per acre. This method of manuring has produced good results with rambutan and other stocks.

*BASTARD TRENCHING.—The land is marked out and the soil at one end removed to a depth of 9 inches for a width of 2 feet. The soil from this trench is placed at the other end of the bed for the purpose of filling the last trench. Farmyard manure and other organic matter are laid in the open trench and the soil is then moved forward two feet through the whole of the bed.

Principal Fruits in Malaya.

There are a large number of fruits suitable for cultivation in Malaya. One writer enumerates 39 principal fruits for cultivation, 47 fruits of less importance, 44 indigenous fruits, infrequently cultivated, but collected and eaten by Asiatics, and 5 fruits suitable only for growing on the hills in Malaya. It is beyond the scope of this Journal to give a complete account of all the fruits of Malaya; a selection of the more important and well known has been made and brief notes given concerning each of them.

Achras sapota. Sapodilla. CHIKU (M).

This well-known fruit is cultivated throughout the Peninsula. It is a large symmetrical shrub, or small tree, 10 to 20 feet high. A good chiku fruit should be about 3 inches long and 2 inches in diameter. The skin is rough, and russet brown in colour, thin, and enclosing a quantity of sweet brown pulp. The fruit is produced almost throughout the year, but is usually most plentiful about the middle of the year. The fruits are picked in an unripe condition and ripened in bran or straw in a dry place.

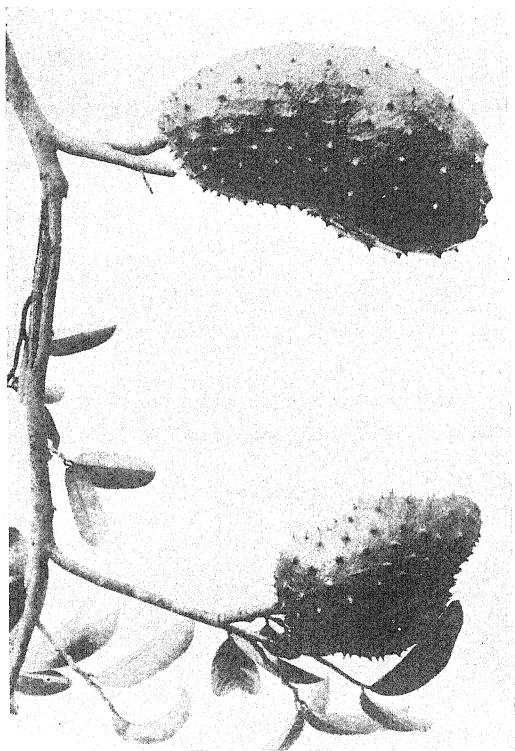
The chiku makes slow growth, but quite young plants will bear fruit. The most common method of propagation is marcottage. Trees grown in this manner frequently reach the fruiting stage in a year or so from planting. The distance of planting should be 20 feet apart.

Anacardium occidentale. CASHW-NUT. Gajus, Jangus or Jambu Parang (M.). A low-spreading tree well-established along the sea coast in Malaya. The curious fruit is composed of a swollen stalk or peduncle, at the extremity of which a kidney-shaped nut, about $1\frac{1}{2}$ inches long, is borne. The peduncle is sweet and juicy and has a pleasant acid flavour. The nut may be eaten either raw or roasted; it is important, however, to remove the slate-covered skin which is extremely acid and highly irritant.

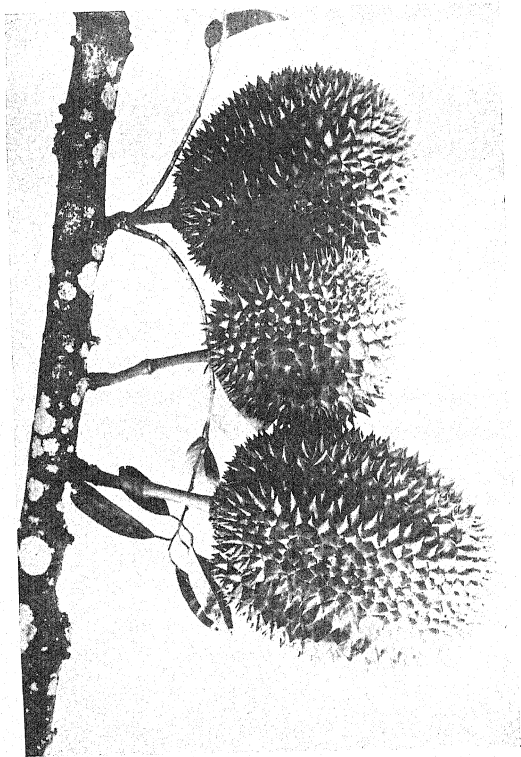
The cashew-nut grows in a sandy soil and near the sea. Trees may be raised from nuts sown in a sandy soil in a shady situation. The plants are later transplanted and spaced 30 feet apart. As there is great variation in the quality of the fruit, scions from superior material should be budded on to seedling stocks about six months old. Budding may be successfully undertaken with this fruit.

Anona muricata. SOURSOP. Durian belanda (M.). A quick-growing tree, reaching a height of about 25 feet, much cultivated throughout Malaya. It produces large kidney-shaped fruits, each weighing about two to three pounds. The skin of the fruit is rough and covered with a number of short, soft spines. The pulp is white, rather fibrous, juicy and somewhat acid. It contains a number of large black seeds and is largely employed for flavouring ices and in the preparation of cooling drinks.

Propagation is usually effected by seeds, but it may also be raised from cuttings. It grows well when budded on to stocks of other species of the genus *Anona*.



SOURSOP FRUITS.



DURIAN FRUITS.

This tree, as well as the custard apple and bullock's heart, is very liable to the attacks of the larvae of the atlas moth (*Attacus atlas*). These caterpillars are best removed by hand-picking. The soursop will grow in most soils, but does best in land that is rather damp. Trees should be planted 20 feet apart.

Anona squamosa. CUSTARD APPLE. Sugar apple. Buah Seri kaya (M). A small tree, 10 to 20 feet high, which appears to thrive well locally in a fairly dry situation on open land. The fruit is about 3 inches in diameter, pale green, and covered with a number of short warty scales. As the fruit ripens, it turns a blackish colour and becomes soft. When ripe, the scales break away separately, exposing the creamy pulp inside. The pulp is very sweet and has a pleasant flavour. The fruit is produced throughout the year but is most abundant in June. Seeds germinate readily. Plants should be spaced 15 feet apart.

Anona reticulata. BULLOCK'S HEART. Nona kapri (M). A small tree, 15 to 25 feet high, distributed throughout Malaya. The fruit is about 3 to 4 inches in diameter, smooth with slight depressions and, when fully ripe, reddish in colour. The pulp is cream-like and yellow near the skin, but almost white in the middle. Several large brown seeds are distributed amongst the pulp. It is raised from seed and planted 20 feet apart in the field.

Artocarpus integrifolia. JACK FRUIT. Nangka (M). This large fruit tree is widely grown throughout Malaya. The Malays recognise two varieties; Nangka beluog with a firm flesh and considered the better kind, and Nangka bubor, the flesh of which is soft. The fruit, which attains a great size, is borne on the trunk and older branches. It is oblong in shape, green in colour, and the rind is formed by a number of conical protuberances. As the fruit matures, it is enclosed in matting to protect it from squirrels, fruit-bats and insects. When ripe the fruit has a strong smell and taste. The large oily seeds are encased in a soft cream-coloured pulp, which is eaten raw or cooked in various ways. The seeds are edible and are roasted and eaten in curries.

The tree is propagated from seeds and succeeds best in a deep loamy soil. Budding on one year old seedling stocks produces strong trees of uniform growth. Under good conditions a tree will reach a height of 25 feet in the third year from germination and commence bearing fruit. The trees are planted 30 feet apart.

Averrhoa bilimbi. BLIMBING. Belimbing buloh (M). A small tree, branching low down. The fruit, produced on the old wood of the stem and branches, is greenish-yellow in colour, about 3 inches long, oblong, slightly furrowed and resembling a small cucumber. It is used in curries or made into jam. The blimbing is widely distributed throughout Malaya and thrives well in most soils. A crop of fruit is usually produced twice a year. The tree is propagated from seed, or by layering. The seeds are very minute and are sown in pots or boxes under shade; later they are transplanted at distances of 20 feet apart.

Averrhoa carambola. BELIMBING BATU (M). A small tree 15 to 20 feet in height. The fruit is produced in axillary panicles, sometimes on the old wood. The yellow fruit is about three inches long, fragrant, acutely four or five-angled and produced in great profusion. There appears to be great variation in the quality of the fruit a fact which it is necessary to take into consideration when propagating the tree. Budding on to one year old seedling stocks is done without difficulty.

Baccaurea motleyana. RAMBAI (M). An indigenous tree of the Malayan region, commonly cultivated throughout the Peninsula. It is medium-sized, of symmetrical shape, for which reason as an ornamental tree, for planting in a lawn, it is most suitable as it has a bold and pleasing outline. The fruits are borne in long hanging strings often two feet in length. The individual fruits, which are produced in great quantity, are about $1\frac{1}{4}$ inches in diameter, buff-coloured, round, with a smooth and thin rind. Inside the rind are three or less, green seeds enclosed in a fleshy edible arillus. There is considerable variation in the quality of the fruit; some are acid, but others are sweet and very palatable. The fruit is eaten raw, but it also may be stewed. It is readily raised from seed and grows well in most soils, but shews a preference for the alluvial soils found adjoining many of the large rivers. Plants are spaced in the field 35 feet apart.

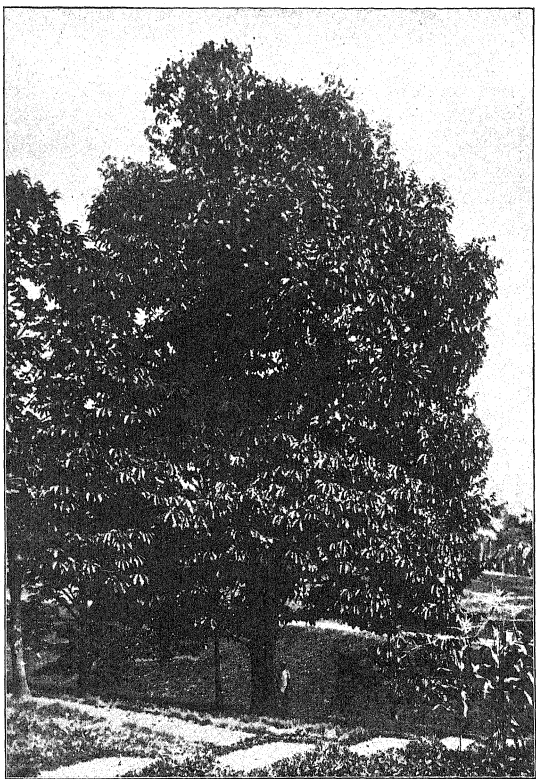
Bertholletia excelsa. BRAZIL NUT. A large tropical tree, often attaining a height of over 100 feet. Introduced to Singapore in 1884 and propagated on a larger scale by the Department of Agriculture at Kuala Lumpur since 1913.

The nuts are contained in a very hard shell, about 14 nuts being in each. The seeds are germinated in a moist warm sand-bed and then removed to a nursery or better still, placed in bamboo joints. When about one foot high they may be planted out, 35 to 40 feet apart.

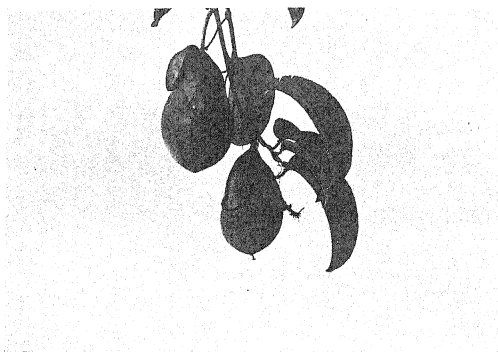
Bouea macrophylla. KUNDANGAN (M.). A glabrous tree found wild in many parts of the Peninsula. The fruit resembles a yellow plum. It is eaten raw, but is better stewed.

Bouea microphylla. RUMENIYA. RAMNIA (M). A large tree, distributed throughout Malaya. The fruit is acid when eaten raw, but excellent for making into preserves. It is almost round in shape and about $1\frac{1}{2}$ inches in diameter. The skin becomes very sticky as the fruit ripens, when it resembles a small yellow plum. The pulp surrounds a single seed, flattened, one inch long, covered with stringy fibre. The fruit usually ripens during July. Plants are spaced 30 feet apart.

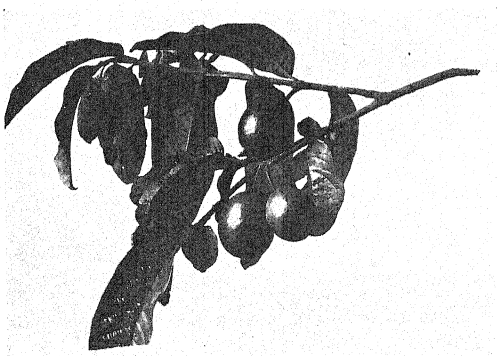
Carica papaya. PAPAYA. BETIK (M). The papaya grows well in Malaya. It is of rapid growth and in suitable soil will produce ripe fruit within one year of the sowing of the seed. The trunk is usually branchless and attains a height of 20 feet, surrounded by a crown of palmate leaves. The large green fruits are produced at the base of the leaves. The papaya fruits throughout the year. The most striking variety has a very large fruit, often over a foot in length. The small fruiting varieties usually produce fruit of superior flavour. The flesh



BRAZIL NUT TREE.



PASSION FRUIT.



GUAVA FRUITS.

should be of full orange colour and fairly firm. The leaves are often used to make meat tender. This is done by wrapping the leaves round the fresh meat for several hours before use.

Papain is obtained from the milky juice which exudes from unripe fruit on scratching the surface with a sharp instrument. The juice is dried, preferably *in vacuo* and the dried product sold as a digestive.

The papaya responds to good cultivation. The young plants are spaced about 15 feet apart. The best fruits are produced during the first three years and though the trees will usually continue to produce fruit for another three years, such fruits are usually very inferior.

CITRUS.

This genus includes the lime, orange, lemon and pomelo. These fruits are often very disappointing in Malaya, due in part to neglect, but also in part to unfavourable climatic conditions. The trees and, in some cases, the fruits—notably of the pomelo—are very liable to the attacks of insect pests. The lime (*Citrus acida*), is the most satisfactory fruit of the group and with good cultivation, will produce heavy crops of fruit.

Citrus fruits may be propagated from seeds, by cuttings, marcottage and the various methods of budding and grafting. Vegetative propagation is to be recommended. Judging from experience elsewhere in the tropics, the choice of suitable stocks is an important matter in citrus culture. The Japanese citron (*Citrus nobilis* hybrid), Saramacca citron (*C. Amantium*), rough lemon (*C. Limonia*), and sun orange (*C. Amantium*), are the stocks most commonly used.

Citrus acida. LIME. Limau asam (M.). There are a number of varieties, the best and commonest being "limau nipis" which is sold in fair quantities in local markets. "Limau kedangan" has a small fruit, and tastes like an orange. "Limau kesturi" is a small tree with narrow leaves and small, round and very acid fruits, used for pickling. "Limau susu" is a large fruit chiefly used in washing clothes. "Limau kerbau", a large oblong fruit, yellow when ripe.

Citrus Aurantizum. ORANGE. Limau manis (M.). Require a good soil. The damp climate of Malaya is probably unsuited to them. The fruits are green and do not turn yellow when ripe. In Malaya trees are generally raised by marcottage.

Insects are generally troublesome, especially caterpillars and scale insects. Mealy bugs often appear and must be destroyed with kerosene emulsion applied with a stiff brush. Red ants make their nests in the trees by drawing a number of leaves together. They are undesirable on account of the fact that they establish and tend colonies of scale insects, for the purpose of securing their "milk". The nests are destroyed by scorching them with fire, applied by means of a piece of sacking dipped in kerosene and tied to the end of a long pole.

Citrus maxima. POMELO. Limau Batawi or L. besar (M.). Numerous forms of this well-known fruit are known in Malaya, differing in the size and colour of the fruit. The pomelo grows well in many districts, especially where the soil is low-lying and of an alluvial nature. The mature tree attains a large size and in planting, a distance of 35 feet is allowed between the trees.

The pomelo is very susceptible to the attacks of the pomelo moth (*Nephopteryx sagittiferella*). The only effective method of preventing damage by this insect is to "bag" each growing fruit.

Citrus nobilis (MANDARIN ORANGE). This orange is readily grown, but poor varieties with watery fruit of poor flavour are continually met with in Malaya. It is the most promising dessert citrus for local cultivation. The mandarin orange in its various forms is easily distinguished owing to the skin peeling without difficulty and the sections readily parting. Large quantities of these oranges are imported from China during December and the early months of the year.

Durio Zibethinus. DURIAN. The durian is widely distributed throughout Malaya. On low alluvial soil the tree may attain a height of 100 feet, whereas on stiff clays and poor soils the tree remains stunted and frequently unproductive. The tree fruits about 8 years from planting. The main crop is produced in July and August, but usually a definite subsidiary crop is also obtainable at the close of the year.

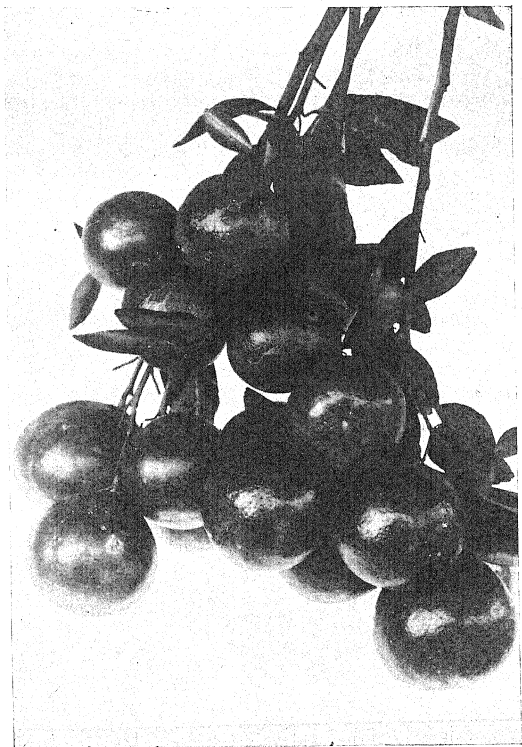
There is considerable variation in the size and quality of the fruit, and some possess a stronger odour than others. The very large kind weighs from ten to fifteen pounds and is known as durian kepala gajah.

A good durian should have little of the strong odour for which it is famous and should have plenty of pulp on the seeds.

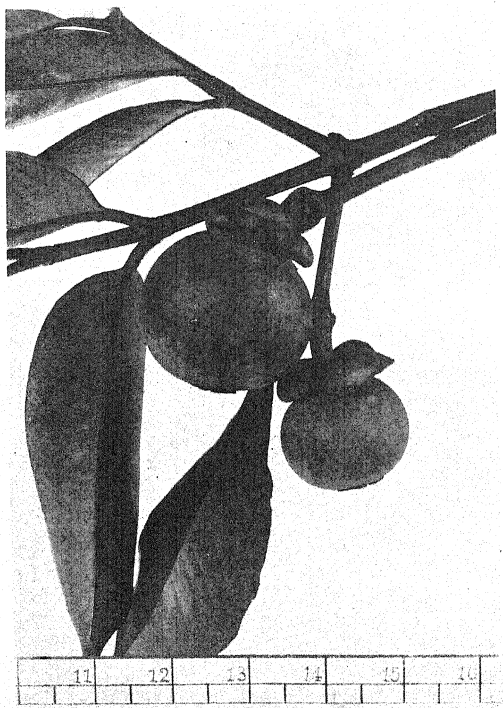
The durian is readily raised from seed if sown fresh. The vitality of the seed is short and poor germination is likely if the seeds are kept for more than a week. The tree is very impatient of disturbance of its roots. A mature tree has a large spread so that the planting distance is 50 feet apart.

Garcinia mangostana. MANGOSTEEN. Buah manggis (M.). The mangosteen is one of the best and most sought after fruits in Malaya. The tree is variable in shape, but it is usually conical, about 15 feet high. Very tall trees require to be pruned back.

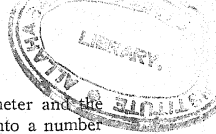
The mangosteen grows best on low-lying alluvial soil and though liking plenty of moisture round the roots, good drainage is necessary. Very good trees are often seen growing in low-lying situations under the shade of rubber trees. The surface soil beneath the trees is cultivated periodically and mulched. During the early stages of growth shading is necessary, which may be removed when the trees are well established. The plants are spaced 25 feet apart. The main crop is gathered during August and September, a smaller crop being produced about November.



MANDARIN ORANGES.



MANGOSTEEN FRUITS.



A good mangosteen should be two and a half inches in diameter and the edible pulp one and a half inches through. This pulp is divided into a number of segments, varying from five to seven. These segments may contain seed, but a large proportion of them are infertile.

Lansium domesticum. LANGSAT. A medium-sized tree widely distributed throughout Malaya. The small yellow flowers are produced in abundance on the old wood and branches in small racemes. The fruit is round or oval, 1 inch in diameter and $1\frac{1}{2}$ inches long, with a thin buff-coloured rind, which when broken exudes a small quantity of white latex. The sweet pulp surrounds two or three thin green seeds and is very palatable. The langsat is raised from seed and is of slow growth. It prefers a good low-lying soil.

Lansium domesticum var: *duku*. DUKU. The duku is said to be a cultivated and improved form of the langsat. The rind is thicker than that of the langsat, splits into five pieces when ripe and does not contain latex. The fruit is from $1\frac{1}{2}$ to 2 inches in diameter. The pulp is sweeter and the fruit generally superior to the langsat. The fruit usually ripens during the latter part of August and September.

Mangifera indica. MANGO. Mempelam (M.). In Malaya, the mango fruit produced is usually of very inferior quality. It thrives in a deep and well-drained loamy soil, and requires a hot and rather dry climate.

Nephelium lappaceum. RAMBUTAN. This well-known fruit, probably indigenous to Malaya, is a tree of medium size. The main crop is generally ripe in August and September and is followed by a secondary crop towards the end of the year. The colour of the fruit varies from yellow to crimson. There are also variations in flavour and quality of the flesh on the stones. In the best varieties the flesh comes away easily from the stone.

The rambutan will grow in most soils, but responds to good cultivation. The Malays usually raise young plants by marcottage, but well-formed trees may be raised from budded seedlings, and undoubtedly, this form of reproduction will be commonly undertaken when it is better known. Plants are spaced 35 feet apart.

Nephelium mutabile. PULASAN. The pulasan is a very similar tree to the rambutan, though usually smaller. The fruit ripens several weeks earlier than the rambutan and is larger and covered with stunted processes instead of the long hair-like spines of the latter. The flesh is thick and firm and enclosed in a thick rind. The fruit is a deep purplish-brown and superior in flavour to the rambutan.

The pulasan requires the same cultivation as the rambutan. It may be propagated from seed, though it is possible to raise plants by marcottage. Budding is easy and successful, as for the rambutan.

Persea gratissima. AVOCADO PEAR or Alligator pear. This fruit tree grows well in Malaya, although being a comparatively recent importation, it is not very well-known.

Under cultivation the tree reaches a height of 25 to 30 feet. The fruit is pear-shaped, covered with a green skin, which turns yellow or purple as the fruits mature. The flesh is firm, greenish-yellow in colour and encloses a single large round seed. A large fruit may be over 4 inches long and weigh almost a pound. The flesh is scooped out with a spoon and eaten as a salad, with the addition of pepper, salt and vinegar. The fruit is picked when nearly ripe and kept in a cool place until soft, when it is ready for consumption.

The tree may be propagated from seed or by budding. Vegetative reproduction is recommended. The plant is easily cultivated and in good soil will make very rapid growth. It appears to favour a soil of good depth, moist but well-drained. The plants are spaced 35 feet apart. The fruit is liable to attack by a large borer.

Psidium guajava. GUAVA. Jambu biji (M.). The guava is a spreading hardwood shrub, or small tree, and is common in Asiatic homesteads in Malaya. There are two varieties in Malaya—one with white flesh, the other pink. The tree reproduces itself freely from seed. It is of rapid growth and produces fruit within a few years from seed. Plants are spaced 25 feet apart.

Less Important Fruits.

There are a large number of other fruits, either cultivated or occurring naturally in Malaya. The following notes must suffice to introduce them to the reader.

Eugenia aquea. Jambu ayer mawar (M.). A small tree producing a pink-coloured soft watery fruit.

Eugenia malaccensis. Malay apple. Jambu bol (M.). A large tree producing a pear-shaped, rather flavourless fruit.

Eugenia uniflora. Pitangi. Surinam cherry. Chermal belanda (M.). A shrubby tree producing red, waxy, cherry-like fruits.

Hibiscus Sabdariffa. Roselle. Jamaica or Red Sorrel. An annual shrub, the fleshy calyx and bracts of which are edible.

Passiflora laurifolia. Jamaica honeysuckle. Water lemon. Buah susu (M.). A perennial climber, bearing orange-yellow fruits.

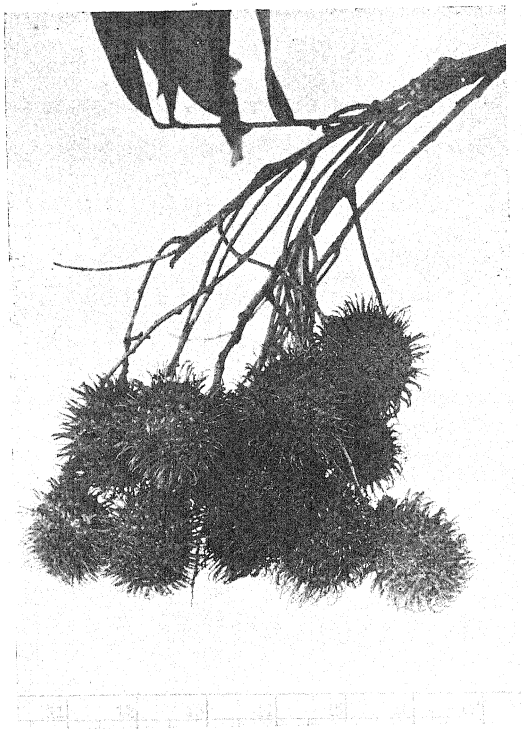
Artocarpus incisa. Bread-fruit. Sukum (M.). A large tree bearing a fruit which in Malaya is of rather poor quality.

Artocarpus Polyphema. Chempedak (M.). A Malayan tree bearing fruit similar to jack fruit, though smaller in size.

Garcinia atroviridis. Assam gelugor (M.). A handsome tree bearing an orange-yellow fruit, about 3½ inches long and 2½ inches in diameter, flattened at both ends and regularly grooved from top to bottom. Malays sun-dry the sliced fruit, which is afterwards eaten with curry.

Nephelium malaiense. Mata kucing (M.). A medium-sized tree bearing a fruit very popular with Asiatics.

In addition to the above there are a large number of fruits eaten but not as a rule cultivated by Asiatics.



RAMBUTAN FRUITS.



CARAMBOLA FRUITS.

Pests and Diseases.

There are numerous pests and diseases that cause damage to fruit trees in Malaya. Under the headings of the respective fruits occasional reference has been made to certain pests and diseases that are of common occurrence.

Fruit trees are very liable to damage by parasitic and epiphytic plants. The former are the more harmful as they obtain part of their nourishment from the tree upon which they grow, whereas epiphytes merely grow on the surface of the bark and do not penetrate. The most injurious of all the parasites are the several species of *Loranthus*, which resemble in habit and are closely related to the European mistletoe. These shrubs are widely distributed throughout Malaya, but are most common in cultivated areas. The species most commonly met with is *Loranthus ferrugineus*, a straggling shrub with entire, opposite leaves about 2 inches long, the undersides being covered with a rusty-brown tomentum. All species of *Loranthus* are highly injurious to the trees they grow upon as their roots penetrate the tissues of the host plant and form channels through which certain food materials are extracted.

Parasitical plants seldom kill their host plant outright, but do considerable local damage to the branches on which they grow. The affected branch gradually dies, meanwhile the parasite obtains a hold upon other parts of the tree by means of its creeping stems with adhesive discs.

Branches that are badly affected by parasites are removed by cutting the bough off below the part on which the parasite has gained a hold. A saw is used for this operation and all exposed surfaces must be given a coating of tar or other disinfectant. If taken when young, the parasite may easily be removed by hand. The remains of its roots are shaved off with a knife and a coating of disinfectant applied to prevent the access of fungi and insects.

The majority of epiphytes do little damage. The most injurious is the little creeping fern, *Drymoglossum piloselloides*, easily recognised by its round flat vegetative fronds and erect narrow spore-bearing ones, and *Dischidia nummularia*, a creeping plant having round, fleshy leaves produced close together and lying flat on the bark. Plants of this description should be scraped off before they spread over the main branches of the tree.

Red ants (kerengga), *Oecophylla smaragdina*, are frequently a source of trouble in fruit trees. These insects make their nests amongst the branches by drawing together a number of leaves. The nests have to be burnt out.

Trade.

There is a very considerable import of fruits into Malaya. In 1933, over 8,000 tons of fresh fruits and about 4,000 tons of dried and preserved fruits were imported. Most of these imports are of varieties which are unsuited for cultivation in Malaya. At the same time, it is possible that if the locally produced fruits were of better quality and if supplies were more regular, the demand for imported fruits would be less.

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Extracts

THE CANNED PINEAPPLE MARKET.*

The United Kingdom Market.

In common with canned fruits as a whole, considerable growth has taken place in the United Kingdom imports of canned pineapple since the war, and in 1932 imports reached the record total of 966,000 cwts. with a declared value of nearly £1½ million. In 1933, however, there was a decline of 18 per cent. to a total of 793,000 cwts. valued at £880,000. Compared, however, with the average for the five years 1927—31 (692,000 cwts.), imports in 1933 showed an increase of 15 per cent., and were greater than the average for the five years 1922—26 (561,000 cwts.) by 41 per cent. It is interesting to note that in the year 1913 only 270,000 cwts. of canned pineapple were imported.

Although the volume of pineapple imported increased considerably during the years 1921—31, there was not much change in the relative position of this fruit in the United Kingdom canned fruit import trade. In 1931, canned pineapple comprised 26.2 per cent. of the total imports of canned fruit preserved in syrup as compared with averages of 28.8 per cent. and 27.3 per cent. for the periods 1921—25 and 1926—30 respectively. In 1932, in spite of increases in the quantities of other classes of fruit, the percentage of pineapple in the total rose to 30.2 per cent., but in 1933 the percentage receded to 26.3 per cent., or almost the same as in 1931.

There have been no significant alterations in the countries of supply in recent years, although the growing importance of Australia and the increasing imports from Japan, probably of Formosan origin, are worthy of note. Up to 1932, however, there was a tendency to change in the proportions coming from different countries. Empire countries continued to take a large and growing share of the trade, and in 1932 accounted for over 94 per cent. of the total imports of which all but 2 per cent. came from British Malaya. In 1933 there was a setback from this very high percentage to 92 per cent., British Malaya alone supplying nearly 90 per cent. But while the proportion received from this source has attained a high figure, the percentage of imports from South Africa has recently declined to small proportions. A similar movement has been noticeable in the trend of supplies from Hawaii, practically the only foreign source of any consequence up to 1933, when Formosan fruit became of importance for the first time; between 1928 and 1933 the share of Hawaii actually declined from 15½ per cent. to less than 6 per cent.

For some years only negligible quantities of canned pineapple were received from Australia, but there was a revival in 1932, when some 10,500 cwts. were imported from that country, and the total was further increased to 15,900 cwts. in 1933. Small consignments have also been received from Fiji (1,200 cwts. in 1933 and 1,700 cwts. in 1932), while a new feature in 1932 was an importation from Mauritius amounting to 500 cwts., which increased to 1,300 cwts.

*The following extracts are reproduced from "Canned and Dried Fruit Supplies in 1933, prepared by the Intelligence Branch of the Imperial Economic Committee, July 1934" by permission of the Controller of His Majesty's Stationery Office.

in 1933. Imports from Japan (probably Formosan) were very small until 1933, when 8,900 cwts. were registered as against 1,800 cwts. in 1932 and only 80 cwts. in 1931. From Hayti 2,800 cwts. were imported as against only 40 cwts. in 1932. The industry of Fiji, Mauritius and Hayti is as yet only on a small scale, but in Formosa it is considerable and growing fairly rapidly.

Seasonal fluctuations of imports of Malayan canned pineapples are fairly well defined. In the first three or four months of the year shipments remain comparatively steady and arrive on a fairly substantial scale, reflecting the winter pack in November and December. May is normally a month of lower imports, but, following the main packing season, a substantial advance occurs in June and the peak of the imports generally occurs in this month or in July. Imports in August and September usually continue on a considerable but decreasing scale until the month of minimum imports is reached in November.

The small imports from South Africa are, as a rule, fairly evenly distributed over the year. The seasonal change is not very well defined, but, as would be expected, the peak of the shipments generally occurs in the spring. Imports from Australia in 1933 were fairly evenly spread throughout the year, although there was a falling-off between September and November. Imports of Hawaiian pineapple differed considerably in 1933 from the normal trend. Usually the imports reach a peak, though not always their maximum, in February. In the following months a sharp decline is recorded until the lowest point is reached between June and August. The pronounced upward trend normally starts in September, or in October, and is followed by a decline towards the end of the year.

The Hawaiian Canned Pineapple.

It will be recalled that a scheme of pack restriction was introduced in the Hawaiian Islands to deal with the 1932 output, and the Pineapple Producers' Co-operative Association, Ltd., was formed to control the whole of the canned pineapple produced in the territory. The agreement originally provided for the regulation of the 1932 and 1933 packs only, but it was subsequently extended to cover packing operations for a period of ten years.

Although the 1932 output was restricted to 5 million cases (the actual pack was 5,064,000 cases), the anticipated recovery in consumption failed to materialise, and stocks at the beginning of the 1933 packing season are estimated to have amounted to the large total of about 4.2 million cases. In face of this surplus a pack of 5 million cases was again fixed for the pack year beginning June, 1933; later, however, as the result of improved movement it was considered justifiable to raise the limit to 8 million cases of all sizes, exclusive of juice, a figure which will probably not be exceeded by any great amount. Complete figures are not yet available for the period June to May of the current season, to which period the 8 million limit relates; but in the calendar year 1933—which covers the bulk of the 1933—34 pack, but which also includes some part

of the previous year's output—the quantity produced totalled 7,816,000 cases, a substantial increase on the previous similar period, though still far below the normal for many years before 1932.

Pack and carry-over for the 1933—34 season thus amounted to nearly 12½ million cases, as compared with about 10½ million cases in the previous similar period. The carry-over on the 1st June, 1934, is estimated to have amounted to about 600,000 cases unsold, with an additional 500,000 cases sold, but not shipped. It is expected that the 1934 production will be restricted to about the same quantity as last year, *viz.* 8 to 8½ million cases, but much will depend on the reaction of demand to prices. The capacity of the Hawaiian canneries is about 20 million cases, and restriction of output has been secured not only by strict allocation to each factory, but by confining the acreage under cultivation to the best land and a stricter selection of the fruit used.

Pineapple Canning in Formosa.

Further progress in pineapple canning in Formosa is indicated by the estimates of the output in the year 1933. The industry is at present of little importance in world markets other than Japan, but it has expanded rapidly in recent years. Much attention has been given to research with a view to an improvement of quality which would make possible the development of foreign markets, and a system of grading and inspection of exported fruit is in operation.

According to a report received from official sources the area under pineapple cultivation in 1933 was estimated at 15,800 acres, or an advance of 10 per cent. as compared with the total of 14,400 acres in 1932. The area has doubled since 1928, when the total was 7,400 acres, and the acreage of 5,200 for 1925 has been trebled.

The increased proportion of the superior varieties in the total area is significant. In 1928 the common or indigenous varieties occupied 6,900 acres and the better or imported kinds 490 acres, or under 7 per cent. By 1932 the native sorts had increased to an estimated figure of 10,500 acres and the superior type (smooth Cayenne and Sarawak) to 3,800 acres, or 27 per cent. of the total area. The proportions were, however, unchanged in 1933, the estimated area of the native varieties being 11,600 acres (73 per cent.) and of smooth Cayenne and Sarawak 4,200 acres (27 per cent.). Production rose from 11 million fresh pineapples in 1924 to an estimated total of 96 million in 1932, and the estimated figure for 1933 is 124 million. The quantity of pineapple packed in 1933 is estimated at 45 million cans, or 10 million cans more than in 1932 and more than four times the 1927 total.

Shipments are made all the year round, but chiefly in the period June to November, the months of July and August being the period of maximum export.

The greater part of the annual production of canned pineapple is shipped overseas, mainly to Japan. Consignments to other markets have in the past

been of negligible proportions, but increasing quantities are being sent to foreign countries.

Under semi-official encouragement, a Joint Sales Company was registered with the object of controlling the production of Formosan canned pineapple and of influencing prices in Japan to which the bulk of the exports are shipped. Shares were held by almost all the factories in the island and the company commenced operations in January, 1932. Under the terms of the agreement, supplies of raw material were to be assigned to member companies in proportion to their productive capacity, and members were to be required to sell their produce through the company. The small packers exported their goods to Japan through the company, but some of the largest Japanese controlled companies which had already established selling organisations in Japan were granted special privileges. The companies exported as before, paying a small fee in respect of each case shipped. The result was that only some 60 per cent. of the annual Formosan output actually passed through the hands of the Joint Sales Company, the remaining 40 per cent., in which was included most of the better grade produce, being exported direct by some half-dozen of the larger concerns having their own branches or agencies in Japan. This freedom of the few large Japanese-managed concerns to negotiate their own sales resulted in confusion and competition in prices and losses to the regular members of the Joint Sales Company, and the discriminatory treatment is reported to have led to considerable friction. Although the matter was temporarily smoothed over, the small companies were not satisfied and the Formosan Government, admitting some justification for their point of view, undertook to investigate the possibilities of a more satisfactory arrangement.

The Government has now produced a plan for amalgamating the 80 canneries in the island into one large concern, and an official tour of inspection of all factory premises has been concluded, with a view to assessing the value of each business. It is understood that there is a considerable amount of opposition to the scheme, but at a general meeting of the Cannery Trade Association held at the end of February, 1934, an executive committee consisting of factory representatives and growers was appointed to discuss details of the proposed amalgamation.

The opposition is reported to be mainly from canners of small importance and the suppression of their separate activities by merger may, it is believed, ultimately benefit the industry by the removal of poor quality fruit from the market. There seems little doubt that the Formosan Government holds it to be highly desirable for the future development and prosperity of the industry that a monopolistic concern capable of exercising real and effective control over production, quality, and prices in all grades should be set up, and it is expected that the new organisation will take this form. In its suggested united and reorganised form, the industry entertains high expectations of gradual expansion in foreign markets throughout the world, more especially in China and Europe.

THE COCONUT INDUSTRY AND THE EXCISE TAX.

The following abstract of an article by E. M. Shelton, published in The American Chamber of Commerce Journal of the Philippine Islands, Vol. XIV, No. 12. December 1934, traces the principal reasons for the rise in price of Philippine copra towards the end of the year 1934. Although the article is written from the Philippine standpoint, nevertheless, the reasons advanced for the improved market price of copra and coconut oil apply also to the produce of other countries.

To understand what has recently taken place in the copra market it is necessary to review briefly the gyrations of the market during the seven months the industry has operated under the American processing tax.

During the first quarter of the year 1934 and prior to the passage of the tax, both copra and oil markets were dull with prices subnormal as a result of purely natural causes. When the processing tax became law, the market price of copra started to decline quite steadily and with only minor fluctuations, and late in June reached the record low price of \$1.12½ gold per 100 lbs. c.i.f. Pacific coast.

In retrospect it now seems that this price, which was either near, or in some cases, actually below the cost of production, was largely a psychological product of the tax. Nobody knew with any degree of certainty what would arise from the welter of new possibilities created by the tax and hence nobody wished to assume commitments. The American market was distinctly in the doldrums and buyers refused to operate. Since the Philippine market is chiefly dependent upon American support, the local copra and oil markets reflected the fear of American operators and hence this market was artificially depressed below the world market—below real and intrinsic value. This was the first phase of the post-tax market, a condition created by fear and uncertainty.

At this point European buyers commenced to take advantage of an exceptional opportunity. It will be remembered that American buyers of coconut oil and copra must perforce fill their requirements in the Philippines, unless they are prepared to pay the difference of \$.02 gold per pound on oil made from foreign copra—manifestly impossible. European buyers, faced with no such necessity, were still free to buy in the cheapest market.

In May, Europe awoke to the fact that Philippine copra was 10 to 15 per cent. cheaper than any other world market and commenced buying on a large scale. This movement gained momentum in June and continued through July, August and September. During the months of May, June and July, the American market took a relatively insignificant quantity of Philippine copra, while Europe continued to buy on a hitherto unprecedented scale. This was the first step in recovery from the condition of fear and maladjustment growing out of the passage of the excise tax, and was to some degree anticipated. The pressure which forces commodities to flow from a lower to a higher market was being freely applied and the second phase of the crisis was over.

In July the market really started to exhibit some vitality and by the end of that month prices had actually begun to climb. At this point we come to the real crux of the recovery. In August the market was simultaneously boosted by the phenomenal drought in the Middle West and the combined effects of the Agricultural Adjustment Administration (AAA) crop destruction and acreage restriction schemes. Hogs were slaughtered, livestock perished and grains, cereals and cotton were either destroyed by the drought or reduced under the AAA. Meantime Europe continued buying Philippine copra, and these forces, powerful individually, were quite irresistible when combined, supplying the market with a powerful lift. By late August the market had definitely recovered with sales of copra at \$1.375 gold Pacific coast.

In September, American buyers finally awoke to the realization that as they must perforce cover their requirements in the Philippines—or pay a penalty of \$.02 gold per pound (on oil)—and as the supply of Philippine copra was not inexhaustible, and Europe already having made tremendous inroads on the 1934 production, they would *have to enter the market* or see part of their supplies move to Europe.

This paved the way for that extraordinary rise in prices which elicited much comment. Copra prices soared in six weeks from around \$1.35 gold Pacific coast to a maximum of \$1.75 gold recorded early in October. This unusual flurry, which developed a highly speculative interest toward the end, was followed by a slight recession in October when the artificial quality of the later advance became apparent, but as this is written the market is again advancing under the influence of the recent typhoons and reported damage in producing areas.

So much for perspective. The significant result is that the oil and copra markets actually stand some 20 to 30 per cent. higher today than they did in the first quarter of 1934, and immediately prior to the imposition of the tax.

It would be easy to jump to the superficial conclusion that a complete recovery from the effects of the excise tax has been consummated. Such a view overlooks the fact that the rapid recovery has been made possible solely by an extraordinary chain of events which the future is unlikely to duplicate. It was the fortuitous turn of the wheel of chance which gave the coconut industry in rapid succession, unprecedented European buying, crop restriction, crop destruction and artificial price raising by various governmental agencies, and lastly a drought in the Middle West of devastating severity.

Rising prices of fats and oils in America have nullified the effects of the \$.03 gold per pound excise tax as, while copra and coconut oil have risen only moderately during the year 1934, the price of lard and cottonseed has doubled, and tallow has advanced more than 60 per cent. The excise tax on coconut oil has therefore been absorbed by this general price advance of domestic fats and oils.

The present condition being largely artificial, prices will not be artificially maintained for ever. Already there is talk of abandoning the price-raising policy, so that sooner or later prices will be left to natural laws. The American buyer will then quickly discover that coconut oil plus the tax will once more cost more than domestic fats and oils and the Philippine producer will begin to feel the effects of the tax. Normal times and normal prices will result in a substantial reduction of coconut oil exports to America.

The effect of the processing tax has been to shut out Philippine oil and copra, while the American buyer has been compelled to satisfy needs by substitutes from various parts of the world—tallow from Australia under the relatively low tax of $\frac{1}{2}$ cent gold per pound, and coconut oil free fatty acids from Europe under a duty of only 25 per cent. *ad valorem* (about $\frac{1}{3}$ rd of the excise tax).

These fatty acids from Europe are in large part from Philippine copra, so that when Philippine exports of copra to America fell from 208,493 metric tons in 1933 to 120,194 metric tons for the first 10 months of 1934, Philippine exports to Europe simultaneously jumped from 88,663 metric tons in 1933 to 138,620 metric tons for the first 10 months of 1934, and the copra which America is vainly trying to keep out by an excise tax, now moves to Europe where some of it replaces the tallow which Europe now sells to America, and some goes into fatty acids for the American market.

Simply stated, the United States by penalizing copra imports has caused the rest of the world to buy more copra, while simultaneously the rest of the world sells to the United States tallow, fatty acids and other substitutes which are cheaper, duty included, than copra plus the tax. Most of this change in the normal flow is unnatural and expensive.

Reviews.

Groundnut Products.

*Prepared by the Intelligence Branch of the Imperial Economic Committee,
H.M. Stationery Office, London, October 1934, 241 pp. Price 4s. net.*

An appreciation of the world position regarding any one vegetable oil product necessitates consideration of other vegetable oils. With modern processing methods, vegetable oils are very largely interchangeable, so that fluctuation in supplies coming into the market of any one raw material for oil production not only influences the price of that product, but of competing raw materials.

The statistical survey of world production and consumption of oilseeds and nuts was originally undertaken by the Empire Marketing Board, and when that body ceased to exist, this valuable work was continued by the Intelligence Branch of the Imperial Economic Committee, which is responsible for the present publication, which deals exhaustively with the production and trade in the British Empire and foreign countries of groundnut products.

Three volumes are now available in this series which constitutes a survey of oilseeds and vegetable oils. Volume I deals with oil palm products, volume II with coconut palm products, and the third volume with groundnut products. It is to be hoped that further volumes are to be prepared dealing with the other important oilseeds and vegetable oils.

The area cultivated with groundnut in Malaya is not large, but the groundnut oil market is of considerable interest. In the first place, these products are imported into Malaya in large quantities (the net imports in 1934 of the oil were 6,113 tons and of the nuts 14,357 tons, to a total value of \$2,281,370), and the influence, both local and in the world markets, of these products is not without considerable effect on the market for coconut and palm oils, which are produced in this country in large quantities. The present contribution to the literature on vegetable oil products is deserving of study by those interested in any of the crops which come under this category.

D. H. G.

Some Agricultural Enterprises in Malaya.

*M. J. Kennaway. Published by The Straits Times Press, Ltd, Singapore.
132 pp., 32 illustrations. 1933—34. Price \$2.50.*

The author presents a series of thirteen essays recounting visits to some of the well-known centres of agricultural enterprise and research in Malaya. They include accounts of the forestry method of rubber planting as practised on Cetor and Kirby Estates in Negri Sembilan, the history and results of bud-grafting rubber on Prang Besar Estate, Selangor, the Dunlop Estates and organisation in Malaya and the system obtaining on one of the largest oil palm estates in Malaya—Ulu Remis Estate, Johore, besides visits to experimental centres and to Cameron Highlands.

The last two essays touch on green manuring and the Planters Benevolent Fund 1933 Report. They appear to be somewhat out of place in a book such as this which otherwise is devoted to descriptions of planting enterprises in Malaya and to personal observation thereon.

In a Foreward, Dr. H. A. Tempany, Director of Agriculture, states:—
“There is in Malaya a large output of technical and semi-technical literature on agricultural subjects particularly in the publications of the Department of Agriculture and of the Rubber Research Institute. This naturally tends to express the viewpoint of the specialist and the trained scientific agricultural worker; on the other hand, the planters’ point of view is not so often seen presented in ordered form in print.

“This point of view has, however, its own considerable importance. In producing this work Mr. Kennaway has rendered a useful service; he has brought to the notice of the public many agricultural developments and planting enterprises which might otherwise remain but little known and has recorded his impressions thereof as a practical planter.”

The reader will probably be most impressed by the account of the Dunlop organisation in Malaya. It is an informative article on a subject about which most readers will have little or no knowledge.

The illustrations throughout the volume have much to commend them. They are large, well-produced and give a vivid insight into the agricultural enterprises described by the author.

D. H. G.

Departmental.

FROM THE DISTRICTS.

*Compiled by the Chief Field Officer from Monthly Reports submitted
by Field Officers.*

The Weather.

Throughout the Peninsula the weather was hot and dry for the greater part of the month, but showers became more frequent in most parts of the country in the third or fourth week. Even on the western side, where dry conditions are normal in February, the rainfall was on the whole below the average, while on the east coast the deficiency was much more pronounced.

Remarks on Crops.

Rubber.—Prices in most centres were steady and showed no marked variation from those of January. In Selangor there was an increase in price of coupons without rubber, which at \$14 per picul exceeded the price of \$12 per picul for rubber not covered by coupons.

The heavy and uniform wintering was nearly completed by the end of the month and in several parts of the country the new foliage was developing rapidly. The reduction in export rights has led some owners of small holdings to rest their trees during the wintering period, especially in areas where the padi harvest is in progress; while in other parts more conservative tapping systems have been adopted. These factors and the dry weather are reported to have led to a decline in crop.

The conditions described greatly reduced the incidence of mouldy rot disease. Attacks of *Oidium Heveae* on the young foliage were reported from south and central Kedah, Province Wellesley South, Perak South, Selangor, Negri Sembilan, Malacca and Northern Johore, but in most cases these attacks were mild.

Padi.—Padi harvest progressed rapidly under favourable conditions in Kedah, Province Wellesley and Penang, Krian and most other parts of Perak, Negri Sembilan except Jelebu District, Malacca, Raub and the road mukims of Lipis in Pahang, Kelantan and Northern Johore. By the end of the month work was practically completed in North Kedah, Province Wellesley North, Upper Perak, Tampin, Rembau, Seremban, most parts of Malacca, Raub, the road mukims of Lipis, and northern Johore except at Tangkah.

In Kedah it is confirmed that the crop is likely to be considerably below that of last season owing to adverse weather conditions. In Kelantan, on the other hand, the crop is expected to be the best obtained for some years. In Krian and Province Wellesley the general prospects for the crops remain good, if the fine weather continues. The crop in Upper Perak was again good, but in other

parts of the State planting has been irregular and some of the riverine mukims have suffered from flood damage, so that prospects are variable. In Western and Central Pahang and the inland areas of Malacca the crop on the whole is good, but late planting and dry weather are expected to cause an almost complete loss in some of the coastal areas of Malacca. In Negri Sembilan the crop should be fair.

There has been keen competition among buyers for the new crop in Krian with a consequent rise in the local price. A tendency to speculation has been manifest in that stocks are being held in the hope of a further rise. A slight improvement in the price of padi is recorded generally throughout the country. In Malacca growers have sold considerable quantities of padi to rice dealers in the town at prices between \$1.80 and \$2 per picul.

The new rice mill at Temerloh was officially opened by H.H. the Sultan of Pahang on the 28th February. In the trial runs a fairly good quality of rice was obtained. The Co-operative Societies Department in Kedah has commenced the erection of a rice mill near Alor Star, equipped with the latest type of machinery and having a capacity of 20 bags of rice a day.

Coconut and Copra.—Copra prices declined steadily during the first half of the month from \$4.80 per picul in Penang to \$4.55. Subsequently they rose again to \$5.10 per picul. Local prices for both copra and nuts have fluctuated in accordance with the Penang or the Singapore market, but a seasonal shortage of nuts, which may be more pronounced this year than is usual, has enhanced local prices in areas where there are oil mills, as for example the Coast Districts of Selangor and Malacca where prices for copra ranged from \$4.40 to \$5 per picul. The shortage of nuts is reflected in the rise in the price of nuts for domestic use in some of the inland districts where they have varied from 3 to 5 cents each. It is also shown by the rise in price of home-made coconut oil from an average in January of about 11 cents per bottle to figures ranging from 14 to 20 cents per bottle in different localities.

Pineapples.—In Singapore fruits were not so plentiful as in January and factories were working to a reduced output.

Tobacco.—In Kedah some 56 acres were planted with tobacco during the month and in Pahang small areas were planted near Jerantut and Pekan. In most parts of the country prices for dried leaf ranged from \$20 to \$50 per picul according to quality, but in Perak a shortage of supplies, possibly due to the failure of the crop in the recent dry weather, caused a considerable rise in price, first quality leaf fetching \$45 to \$82 per picul in different parts of the State. In Pahang West the price at \$55 to \$60 per picul was also above the average.

Tuba.—Some 240 acres have recently been planted with this crop on an estate in Pahang. There was a continued large demand for planting material from the Changi area of Singapore Island, as a result of which the supply is reported to be rapidly nearing exhaustion.

Cloves.—The clove harvest was completed in Penang Island during the month and dried cloves were sold in Georgetown for as high a price as \$45 per picul.

Agricultural Stations and Padi Test Plots.

The continued spell of dry weather hindered planting operations on the Agricultural Stations. Work was, therefore, mainly confined to harvesting certain temporary crops, routine maintenance and the preparation of land for replanting temporary crops. Felling and burning were completed on the site of the new Agricultural Station in Raub District. The area was fenced and four main drains were dug. Clean clearing and levelling were in progress.

Harvest was finished at the Padi Experiment Stations in Kedah, Krian and Kelantan and on a number of Padi Test Plots. Preliminary results show that the Malacca strain Siam 29 again did well at the Briah Test Plot in Krian, Kendong in Negri Sembilan, Lipis and Dong in Pahang and Pasir Puteh in Kelantan. This strain has now clearly proved its adaptability to different conditions and its high-yielding power, in consequence of which it is becoming popular in several parts of the Peninsula. Its main defect is its somewhat weak straw. A new strain Milek Kuning 3, selected in Malacca from a variety popular in the Pekan District of Pahang, gave good results at Kendong and on the Lipis, Dong and Temerloh Plots in Pahang. At Lipis it yielded at the rate of 588 gantangs and at Dong at the rate of 562 gantangs per acre. It has a maturation period of about 7½ months and possesses the desirable character of strong straw. Reyong 20, a recent selection from a variety popular in Kedah, also gave promising results on the two Pahang plots with yields of approximately 450 gantangs per acre. At Lipis the local padi yielded at the rate of 350 gantangs per acre only as compared with yields between 450 and 580 gantangs from the four best pure strains, while at Dong no less than 11 strains gave yields between 450 and 600 gantangs per acre as compared with 317 from the local variety. In spite of the fact that wet weather in January caused much of the crop to lodge on the Lenggong Plot in Upper Perak, yields were again remarkably high, some of the Radin strains giving as much as 900 gantangs per acre.

Instructional Tour.

A second party of nine Penghulus and fifty Malay agriculturists from the Temerloh and Bentong Districts of Pahang paid a three days visit to Malacca at their own expense under the guidance of the Malay Agricultural Assistant, Pahang South. An instructional programme was arranged for them by the Agricultural Officer, Malacca, on the same lines as that arranged for the party which visited Malacca in January.

Rural Lecture Caravan.

The tour of the Rural Lecture Caravan in Selangor, which was commenced at the end of January, was continued in the Klang and Kuala Selangor Districts at the beginning of February. The centres visited were Telok Gadong, Bukit Naga, Rantau Panjang, Jeram, Assam Jawa and Kampong Kuantan. At the cinema shows and evening lectures illustrated by lantern slides the attendances varied from 400 to 1,000 people. The afternoon lectures were attended by fewer people, some 50 to 100, but the intention of these lectures is to appeal mostly to those particularly interested in the subjects dealt with and to give them more detailed demonstrations and information than is possible when addressing a large audience.

Poultry Diseases.

Outbreaks of poultry diseases were reported from Batu Gajah in Perak early in the month and from the mukims of Lipis and Penjom in Pahang in the second half of the month. These were investigated by officers of the Veterinary Department. No information as to the nature of the disease in either case has yet been received. It is noteworthy that, as has been observed on a number of previous occasions, these outbreaks coincided with a spell of unusually dry weather.



DEPARTMENTAL NOTES.

Return from Leave of the Adviser on Agriculture

The Hon'ble Dr. H. A. Tempany, C.B.E., Director of Agriculture, Straits Settlements, and Adviser on Agriculture, Malay States, returned from leave on 22nd February, 1935.

Visits of the Adviser on Agriculture.

The Acting Adviser on Agriculture (Mr. F. W. South) visited Cameron Highlands from 2nd to 5th February. He inspected the Experimental Station, Tanah Rata, visited Boh Plantations and certain other properties and attended the Annual General Meeting of the Cameron Highlands Society on 4th February.

The Adviser on Agriculture (Dr. H. A. Tempany, C.B.E.) attended the opening of the Temerloh Rice Mill on 28th February.

Leave.

Mr. N. C. E. Miller, Assistant Entomologist, has been granted 8 months and 21 days full pay leave from 10th February to 30th October, 1935, inclusive.

Mr. V. Dawson, Senior Lecturer, School of Agriculture, Malaya, has been granted 8 months and 7 days full-pay leave from 1st March 1935 to 7th November 1935 inclusive.

Mr. E. A. Curtler, Agricultural Officer, has been granted 10 months and 19 days full pay leave from 2nd March 1935 to 20th January 1936 inclusive.

Mr. G. E. Manu, M.C., Vice-Principal, School of Agriculture, Malaya, returned from leave on 14th February, 1935.

Transfers.

Attention is drawn to the Staff List on the inside front cover of this number. Several transfers are recorded in the Field Branch in consequence of the return from leave of various officers.

Publications of the Department of Agriculture.

Attention is drawn to two recent special publications of the Department. They are as follows:—

The Oil Palm in Malaya by B. Bunting, C. D. V. Georgi and J. N. Milsum, Malayan Planting Manual No. 1. Price \$2, post free.

The Toxic Value of *Derris* spp. by N. C. E. Miller, Special Bulletin, Scientific Series No. 16. Price 50 cents, post free.

Statistical. **MARKET PRICES.**

February, 1935.

Rubber.—There was little fluctuation in the price of rubber during February, extremes being 20½ and 21½ cents per lb. for spot loose in Singapore. The market strengthened during the month but average prices were slightly lower than in January, No. 1. X. Rubber Smoked Sheet averaging 21.10 cents per lb. as compared with 21.25 cents per lb. in the previous month. The average price in London for January was 6.30 pence per lb. and in New York 12.79 cents gold per lb. as compared with 6.39 pence and 13.01 cents gold in January.

The following table shews weekly prices paid at three centres during the month for small-holders' rubber.

Table I.
Weekly Prices Paid By Local Dealers for
Small-Holders' Rubber, February, 1935.
(Dollars per Picul.)

Grades.	Kuala Pilah, Negri Sembilan.				Kuala Kangsar, Perak.				Batu Pahat, Johore.		
	7	14	21	28	6	13	20	27	13	20	28
Smoked sheet	23.50	23.50	25.24	24.54	23.74	25.71	24.39	27.07			
Unsmoked sheet	21.10	22.14	22.57	23.09	21.31	23.00	21.25		20.97	20.10	23.74
Serap		15.00								18.00	

Transport by lorry Kuala Pilah to Seremban 15 cents per picul, to Malacca excluding duty, 25 cents per picul, by rail Seremban to Penang \$1.24 per picul, Seremban to Singapore \$8.00 per ton.

Transport from Batu Pahat to Singapore by lorry excluding duty, 90 cents per picul.

Transport from Kuala Kangsar to Prai by railway \$6.20 per ton.

Transport from Kuala Kangsar to Singapore by railway \$10.00 per ton (minimum consignment 5 tons).

At Kuala Pilah the standard deduction for moisture in unsmoked sheet is 5 per cent.

At Kuala Kangsar the standard deduction for moisture in unsmoked sheet is 10 per cent. No purchases at Batu Pahat on 6th February, 1935.

Palm Oil.—The market continued its steady upward trend as is shown by the following table of quotations in February for Malayan palm oil and kernels.

Table II.
Prices of Palm Oil and Palm Kernels.

Date 1935.	Palm Oil in Bulk, c.i.f. landed weight Liverpool/ Halifax.	Palm Kernels, c.i.f. landed weight London/ Continent
	per ton	per ton
Feb. 1	£ 20. 0. 0	£ 8. 12. 6
„ 8	21. 0. 0	8. 15. 0
„ 15	22. 0. 0	8. 15. 0
„ 22	23. 17. 6	9. 0. 0

Copra.—Prices again advanced very considerably in Singapore reaching a peak of \$4.85 per picul for the sun-dried grade, which price was maintained at the close of the month. The average price for February for this grade was \$4.60 per picul as compared with \$4.21 in January. The mixed quality also rose, closing at \$4.60 per picul, with an average for the month of \$4.40 per picul, as against \$3.91 in January.

Copra cake fell away slightly at the close of the month, averaging \$1.95 per picul as compared with \$2.25 in January.

Rice.—The average wholesale prices of rice per picul in Singapore during January were as follows:—Siam No. 2 (ordinary) \$3.11, Rangoon No. 1 \$2.89, Saigon No. 1 \$3.02 as compared with \$2.95, \$2.86 and \$2.95 in the previous month. Corresponding prices in January 1934 were:—\$2.91, \$2.72 and \$2.65.

The average retail market prices in cents per gantang of No. 2 Siam rice in January were:—Singapore 22, Penang 20, Malacca 22, being the same as in December 1934.

The average declared trade value of imports of rice in January was \$3.26 per picul as compared with \$3.28 in December and \$3.25 in November.

Padi.—The Government Rice Mill, Bagan Serai, continued to raise its price for padi, and was paying \$2 per picul at the close of February. The privately owned mill was reported to have raised its price similarly. Prices per gantang varied in different parts of the country from 4½ to 12 cents. In Kedah the price rose to 16 cents per gantang.

Tea.—Malayan tea was well represented on the London market in January. Two consignments of Kedah tea were sold at an average price of 10½d. per lb. on each occasion. Boh Plantations tea was sold at an average of 11¼d. per lb. and a consignment from the Government Experiment Station at Tanah Rata averaged 11½d. per lb. Average London prices per lb. paid during January for tea consignments from other countries were as follows:—Ceylon 1s. 1.53d., Java 10.02d., Indian Northern 11.86d., Indian Southern 11.69., Sumatra 9.14d.

The latest available London average prices (7th February 1935) are 1s. 2d., 9.51d., 1s. 0.02d., 11.50d. and 8.91d. respectively. Kedah and Boh Plantations teas were sold at 10½d. and 11d. per lb. respectively.

The following are the latest Colombo average prices available and are quoted from the Weekly Tea Market Report, 9th February, 1935, of The Colombo Brokers' Association; prices are per lb. and in rupee cents:—High Grown Teas 98 cents, Medium Grown Teas 67 cents, Low Grown Teas 54 cents.

Tuba Root (Derris).—The demand for tuba was greater in February than it has ever been, and, owing to the scarcity of Malayan roots, large quantities of tuba of non-Malayan origin were being marketed. The latter, sold on a basis of ether extract, averaged \$30 per picul, the average price of Malayan roots on a similar basis of analysis being \$34.50 per picul, as compared with \$32.50 per picul in January. Good quality roots sold on rotenone content averaged \$46 per picul, an increase of \$1 per picul as compared with the January average. Singapore dried roots were also quoted at \$70 per picul.

Coffee.—Prices weakened slightly during February in Singapore. Sourabaya coffee opened and closed at \$19 to \$19.50 per picul, with a fall to \$18.50 to \$19 in the early part of the month. Palembang coffee averaged \$12.94 per picul as compared with \$13.48 in January.

Local prices for coffee fell back slightly, ranging from \$21 to \$30 per picul in different Districts.

Arecanuts.—A considerable falling-off in the prices of the various grades of this commodity was noticeable in February. Average prices per picul in Singapore were:—Splits \$4.87 to \$5.87, Sliced \$8.62 to \$9.62, Red Whole \$6 to \$7, the price in each range depending upon quality.

The average prices per picul quoted by the Singapore Chamber of Commerce were: Best \$6.70, Medium \$6.26, Mixed \$5.95.

Gambier.—Block improved slightly at the close of February but the average Singapore price per picul for the month was only \$5.12 as compared with \$5.44 in January. No. 1 Cube averaged \$11.62 per picul as compared with \$11.88 in the previous month.

Pineapples.—There was a scarcity of fresh fruit in February coupled with a lack of buying enquiry, and prices remained almost unchanged. Average prices per case shewed some improvement over those of January; they were: Cubes \$3.45, Sliced Flat \$3.17, Sliced Tall \$3.40, as compared with \$3.29, \$3.14 and \$3.35 in January.

Local average prices of fresh fruits per 100 were:—Singapore \$3 and \$2 for large and small sizes respectively; Selangor \$2 to \$2.50 for first quality and \$1 to \$2 for second quality.

Tapioca.—There was a slight improvement in the Singapore market in February, with the exception of Seed Pearl which fell 5 cents per picul. Average prices per picul were:—Flake Fair \$3.75, Seed Pearl \$5.47, Medium Pearl \$6, as compared with \$3.50, \$5.50 and \$5.85 respectively in January.

Sago.—Poor demand was responsible for a dull market in this commodity during February, though an improvement occurred at the close of the month. Pearl, Small Fair, averaged \$3.77 per picul and Flour, Sarawak Fair, averaged \$2.41 per picul. The January respective averages were \$3.98 and \$2.55.

Mace.—Siouw improved to \$110 per picul at the close of the month, averaging \$95 per picul as compared with \$90 in January. Amboina, on the other hand, fell \$5 per picul, to average \$66.25 as compared with \$67.50 per picul in the previous month.

Nutmegs.—Prices in Singapore opened in February at a higher level and remained unchanged throughout the month. 110's were quoted at \$27.50 per picul and 80's at 28.50 per picul, as compared with \$25.50 and \$26 respectively in January.

Pepper.—The crisis in the London pepper market resulted in quotations in Singapore being purely nominal, with no business passing. Averages of quotations per picul were:—Singapore Black \$18.25, Singapore White \$51.50, Muntok White \$53.50. January average prices per picul were \$20.38, \$62, and \$64 respectively.

Cloves.—Prices continued nominal in Singapore at Zanzibar \$35 and Amboina \$45 per picul.

Tobacco.—Local prices varied considerably in different parts of the Peninsula, and in Perak rose as high as \$82 per picul. Average price ranges were \$20 to \$50 per picul, but in Pahang prices were \$55 to \$60 per picul.

The above prices are based on London and Singapore daily quotations for rubber; on the Singapore Chamber of Commerce Weekly Reports for the month and on other local sources of information. Palm oil reports are kindly supplied by Messrs. Guthrie & Co. Ltd., Kuala Lumpur; the Singapore prices for coffee and arecanuts by the Lianqui Trading Company of Singapore, and tuba prices by Messrs. Mackay & Co., Singapore.

1 picul = 133½ lbs. The Dollar is fixed at two shillings and four pence.

Note.—The Department of Agriculture will be pleased to assist planters in finding a market for agricultural produce. Similar assistance is also offered by the Malayan Information Agency, 57, Charing Cross, London, S.W.1.

GENERAL RICE SUMMARY.*

January, 1935.

Malaya.—Imports of foreign rice into Malaya during January were 59,928 tons and exports 18,217 tons, net imports being 41,711 tons an increase of 19.7 per cent.†

Of the January imports 55 per cent. were consigned to Singapore, 16 per cent. to Penang, 7 per cent. to Malacca, 18 per cent. to the Federated Malay States and 4 per cent. to the Unfederated Malay States. Of the total 65 per cent. came from Siam, 30 per cent. from Burma, 4 per cent. from French Indo-China and 1 per cent. from other countries.

Of the exports during January, 70 per cent. were consigned to the Netherlands Indies and 30 per cent. to other countries. The various kinds of rice exported were:—Siam 12,574 tons (69 per cent.), Burma 4,586 tons (25.2 per cent.), French Indo-China 289 tons (1.6 per cent.), India 25 tons (0.1 per cent.), local production 743 tons (4.1 per cent.).

India and Burma.—Foreign exports for the year 1934 totalled 1,383,000 tons, a decrease of 24.4 per cent. as compared with 1,829,000 tons in 1933.

According to the Final Forecast of the Rice Crop in Burma for the season 1934-35 dated 15th February, 1935, the area likely to mature is estimated at 12,307,100 acres, a decrease of 157,200 acres or 1.5 per cent. as compared with the final figures for the season 1933-1934. Production is estimated at 6,800,000 tons of padi, a decrease of 12.6 per cent. as compared with the previous season. The surplus of rice and rice products available for export is estimated at 3,200,000 tons.

Siam.—Exports of rice from Bangkok during December were 190,915 tons, making a total of 1,907,151 tons for the year as compared with 1,584,288 tons in 1933.

According to the First Forecast of the Rice Crop of Siam for the season 1934-35, the total area planted in all the provinces of the Kingdom is estimated at 8,560,000 acres, total production at 64,800,000 tons of rice and rice products, and the surplus available for export at 1,900,000 metric tons.

Japan.—According to the Ministry of Agriculture and Forestry (*Trans-Pacific Journal*, 31st January, 1935), production of rice for 1934 amounted to 7,270,635 tons, a decrease of 26.8 per cent. as compared with the previous year.

The demand and supply for the 1934-35 rice year, on the basis of the 1934 production are as follows:—

<i>Supply</i> : Balance 1933-34 rice year	...	2,299,000 tons.
Rice crop 1934	...	7,271,000 "
Imports	...	1,893,000 "
<i>Demand</i> : Estimated consumption	...	9,958,000 "
Estimated exports	...	60,000 "
showing a surplus of 1,445,000 tons.		

* Abridged from the Rice Summary for January, 1935, compiled by the Department of Statistics, Straits Settlements and Federated Malay States.

† It is to be understood throughout the summary that all comparisons and percentage increases or decreases are in relation to the corresponding period of 1934.

French Indo-China.—Entries of padi into Cholon during January were 158,537 metric tons, an increase of 120.5 per cent. as compared with the previous year.

Exports of rice for the month were 135,066 metric tons, an increase of 42.6 per cent.

The Netherlands Indies.—No further information is available since the December summary.

Ceylon.—Imports during January were 46,510 tons, an increase of 3.15 per cent. as compared with the previous year. Of the January imports, 11.1 per cent. were from British India, 75 per cent. from Burma, 1.6 per cent. from the Straits Settlements and 12.3 per cent. from other countries.

Europe and America.—Shipments to Europe from the East for the period 1st to 24th January, 1935, amounted to 50,345 tons, an increase of 49.1 per cent. as compared with 1934.

Of the 1935 shipments 6.3 per cent. were from Burma, 78.7 per cent. from Saigon, 14.9 per cent. from Siam and 0.1 per cent. from Bengal. The 1934 percentages were 10.6, 75.9, 13.5 and nil respectively.

Shipments from the East to the Levant for the period 1st January to 29th December, 1934, totalled 29,424 tons, an increase of 22.2 per cent. as compared with 1933.

Shipments to the West Indies and America for the year 1934 amounted to 198,196 tons, an increase of 19.8 per cent. as compared with 165,452 tons in 1933.

MALAYAN AGRICULTURAL EXPORTS, JANUARY, 1935.

PRODUCT.	Net Export in Tons.		
	Year 1934.	January 1934.	January 1935.
Arecanuts ...	18,882	3,612	2,768
Coconuts, fresh † ...	100,826†	6,515†	7,152†
Coconut oil ...	25,485	1,763	2,504
Copra ...	95,618	9,263	11,186
Gambier, all kinds ...	2,170	173	240
Oil cakes ...	11,273	1,183	923
Palm kernels ...	3,196	160	345
Palm oil ...	15,852	297	1,265
Pineapples canned ...	66,633	4,667	4,468
Rubber ¶ ...	479,371¶	41,773¶	38,327¶
Sago,—flour ...	10,503	1,525	1,907
„ —pearl ...	6,177	255	503
„ —raw ...	7,079*	464*	696*
Tapioca,—flake ...	5,761	649	237
„ —flour ...	1,842*	184*	263*
„ —pearl ...	15,770	1,099	959
Tuba root ...	481	44½	41

† hundreds in number.

* net imports.

¶ production.

MALAYA RUBBER STATISTICS

ACREAGES OF TAPTABLE RUBBER NOT TAPPED ON ESTATES OF 100 ACRES AND OVER, FOR THE MONTH ENDING 31ST JANUARY, 1935.

STATE OR TERRITORY	Acreage of Tappable Rubber end 1933 (d)	ESTATES WHICH HAVE ENTIRELY CEASED TAPPING		ESTATES WHICH HAVE PARTLY CEASED TAPPING (a)		AREA OF TAPTABLE RUBBER NEVER BEEN TAPPED		Total (3) + (5)	Percentage of (9) to (2)
		Acreage (3)	Percentage of (3) to (2) (4)	Acreage (5)	Percentage of (5) to (2) (6)	Acreage (7)	Percentage of (7) to (2) (8)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
STRAITS SETTLEMENTS :—									
Province Wellesley	44,285	320	7	7,976	18.0	567	1.3	8,296	18.7
Dindings	7,268	112	1.5	670	9.1	139	1.9	782	10.6
Malacca	121,152	115	0.1	15,435	12.7	2,642	2.2	15,570	12.8
Penang Island	1,366	126	9.2	444	32.5	144	10.5	570	41.7
Singapore Island	28,842	1,650	5.7	6,336	22.0	772	2.7	7,986	27.7
Total S.S. ...	203,013	2,343	1.2	30,861	15.2	4,264	2.1	33,204	16.4
FEDERATED MALAY STATES :—									
Perak	253,227	2,439	1.0	37,708	14.9	15,069	6.0	40,147	15.9
Selangor	310,003	4,100	1.3	26,439	13.9	13,030	4.2	47,239	15.2
Negri Sembilan	233,592	5,834	2.5	26,313	12.5	15,375	6.6	35,147	15.0
Pahang	46,712	4,252	9.1	15,840	33.9	10,773	23.1	20,092	43.0
Total F.M.S. ...	843,534	16,625	2.0	126,000	14.9	54,247	6.4	142,635	16.9
UNFEDERATED MALAY STATES :—									
Johore	365,400	7,670	2.1	24,408	6.7	19,537	5.3	32,078	8.8
Kedah (b)	126,588	1,798	1.4	28,886	22.8	19,591	15.5	30,684	24.2
Kelantan	25,793	4,716	18.3	976	3.8	5,084	19.7	5,092	19.7
Trengganu (b)	4,543	Nil	Nil	98	2.2	98	2.2	98	2.2
Perlis (c)	1,181	Nil	Nil	543	46.0	Nil	Nil	543	46.0
Brunei	(d) 4,991	Nil	Nil	1,372	27.5	875	17.5	1,372	27.5
Total U.M.S. ...	528,496	13,584	2.6	56,283	10.6	45,185	8.6	69,867	13.2
Total MALAYA ...	1,575,043	32,352	2.1	213,144	13.5	103,696	6.6	245,696	15.6

Notes :—(a) Area out of tapping on Estates which have partly ceased tapping refers to areas definitely being rested and excludes areas on any tapping round.

(b) Registered Companies only.

(c) Rentered quarterly.

(d) Figures are as reported by estate managers.

MALAYA RUBBER STATISTICS **TABLE I**
STOCKS, PRODUCTION, IMPORTS AND EXPORTS OF RUBBER, INCLUDING LATEX, CONCENTRATED LATEX AND REVETEX,
FOR THE MONTH OF JANUARY, 1935 IN DRY TONS.

State or Territory	Stocks at beginning of month 1			Production by Estates of less than 100 acres and over		Imports		including re-exports		Stocks at end of month	
	Dealers	Ports	Estates at beginning of month 1	during the month	January 1935	during the month	January 1935	during the month	January 1935	Dealers	Ports
MALAY STATES:—											
Federated Malay States	...	...	...	...	...	...	...	...	...	...	...
Johore	8,202	7,057	13,165	6,339	6,339	Nil	Nil	17,935	3,919	12,738	9,922
Kedah	1,201	2,224	4,203	4,508	4,508	Nil	Nil	8,882	4,783	2,892	3,123
Perlis	...	...	...	...	...	Nil	Nil	2,237	1,834	366	2,060
Kelantan	...	...	...	...	...	Nil	Nil	1,730	1,333	...	...
Trengganu	161	27	23	10	10	Nil	Nil	33	138	18	31
Brunei	55	50	196	98	98	Nil	Nil	138	198	294	180
Total Malay States	10,630	11,056	21,042	12,646	12,646	Nil	Nil	22,100	10,737	16,314	15,383
S. SETTLEMENTS:—											
Malacca	3,450	806	1,592	1,592	1,592	Nil	Nil	3,762	3,443	3,443	1,090
Province Wellesley	2,216	434	575	575	575	Nil	Nil	6,980	1,695	1,695	500
Dindings	3,697	11,818	32	121	121	2,089	2,309	11,581	6,980	74	117
Singapore	7,190	39,394	162	244	244	12,833	12,833	368	23,878	3,070	12,862
Labuan	...	...	...	...	...	Nil	Nil	...	Nil	5,951	37,256
Total Straits Settlements	10,887	57,012	1,463	2,550	2,089	15,510	15,510	34,620	34,620	9,021	55,841
TOTAL MALAYA	10,887	67,702	19,519	23,592	14,735	15,510	15,510	67,720	10,737	9,021	72,155

† Ocean—shipments from Malaya of rubber directly consigned from the F. M. S. ‡ Exports of rubber from the F. M. S. during January, 1935.

TABLE II
DEALERS' STOCKS IN DRY TONS

Class of Rubber	Federated Malay States	S. Pore	Penang	Pro-We'sly States	Johore	Kedah
20	21	32	23	24	25	26
DRY RUBBER	11,696	84,781	11,471	5,003	1,857	188
WET RUBBER	1,102	2,945	1,991	371	965	178
TOTAL	12,798	87,726	13,462	5,374	2,822	366

TABLE III
FOREIGN EXPORTS

PORTS	For month 1935
Singapore	28
Penang	29
Port Swettenham	39,930
Malacca	11,652
MALAYA	4,704
	434
	56,720

TABLE IV
DOMESTIC EXPORTS

AREA	For month 1935
80	81
Malay States	28,795
Straits Settlements	2,016
MALAYA	25,742

- Notes:—**
1. Stocks on production of less than 100 acres and stocks in transit on rail, road or local steamer are not ascertained.
 2. The production of rubber in Malaya is estimated from the formula: $\text{Production} + \text{Imports} + \text{Stocks at beginning of month} = \text{Exports} + \text{Stocks at end of month}$. Column (1), Column (2), Column (3), Column (4), Column (5), Column (6), Column (7), Column (8), Column (9), Column (10), Column (11), Column (12), Column (13), Column (14), Column (15), Column (16), Column (17), Column (18), Column (19), Column (20), Column (21), Column (22), Column (23), Column (24), Column (25), Column (26), Column (27), Column (28), Column (29), Column (30), Column (31), Column (32), Column (33), Column (34), Column (35), Column (36), Column (37), Column (38), Column (39), Column (40), Column (41), Column (42), Column (43), Column (44), Column (45), Column (46), Column (47), Column (48), Column (49), Column (50), Column (51), Column (52), Column (53), Column (54), Column (55), Column (56), Column (57), Column (58), Column (59), Column (60), Column (61), Column (62), Column (63), Column (64), Column (65), Column (66), Column (67), Column (68), Column (69), Column (70), Column (71), Column (72), Column (73), Column (74), Column (75), Column (76), Column (77), Column 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METEOROLOGICAL SUMMARY, MALAYA, JANUARY, 1935.

LOCALITY.	AIR TEMPERATURE IN DEGREES FAHRENHEIT					EARTH TEMPERATURE		RAINFALL					BRIGHT SUNSHINE.						
	Means of			Absolute Extremes			At 1 foot	At 4 feet	Total.		Number of days.			Total.	Daily Mean.				
	A.	B.	Min.	Max.	Mean of A and B.	Lowest.					Highest.	Most in a day.	Precipitation, 0.1 in or more.			Thunder-storm.	Fog morning obs.	Gale force 8 or more	
	°F	°F	°F	°F	°F	°F	°F	°F	in.	mm.	in.	Amt.	Precipitation, 0.1 in or more.	Thunder-storm.	Fog morning obs.	Gale force 8 or more	Hrs.	Per cent.	
Railway Hill, Kuala Lumpur, Selangor	90.4	70.6	80.5	94	67	84	73	83.4	84.0	4.77	121.2	1.19	11	8	3		201.60	6.50	54
Bukit Jeram, Selangor	88.1	71.4	79.7	93	69	80	73	83.9	84.7	5.88	149.4	2.02	14	12			288.40	7.37	61
Sitiawan, Perak	89.0	71.8	80.4	92	67	80	74	83.2	84.3	9.17	232.9	3.45	18	12			225.15	7.26	62
Temerloh, Pahang	85.1	70.0	77.5	90	64	74	73	81.1	84.2	9.06	230.1	2.01	17	16			194.50	6.27	53
Kuala Lipis, Pahang	84.3	69.0	76.7	89	63	73	73	80.9	82.7	8.43	214.1	1.80	18	14	24		163.90	5.29	44
Kuala Pahang, Pahang	82.5	73.5	78.0	84	69	76	78	81.1	82.8	13.99	355.4	5.54	16	15			213.05	6.87	58
Kallang Aerodrome, Spore	86.0	73.4	79.7	89	70	76	76	80.0	81.7	3.72	94.5	1.04	9	9	1		192.80	6.22	51
Butterworth, Province Wellesley	87.9	71.7	79.8	92	67	82	75	84.1	84.4	4.01	101.9	1.26	10	10			251.90	8.13	69
Bayan Lepas Aerodrome, Penang	87.6	72.5	80.1	91	67	82	76	82.9	83.7	5.24	133.1	1.54	14	11	1		256.45	8.27	54
Bukit China, Malacca	87.1	72.2	79.7	90	69	82	74	82.2	83.2	2.59	65.8	1.44	8	6			200.55	6.47	54
Kluang, Johore	86.5	69.7	78.1	90	64	81	72	79.9	81.3	4.77	121.2	1.80	11	9	2		200.20	6.46	54
Bukit Lalang, Mersing, Johore	82.1	71.9	77.0	85	64	77	75	79.1	79.7	11.45	290.8	2.35	19	17			204.40	6.59	55
Alor Star, Kedah	88.7	69.1	78.9	92	63	80	74	82.1	83.9	4.02	102.1	1.76	7	5	1		242.65	7.83	66
Kota Bahru, Kelantan	84.3	70.4	77.3	88	65	73	75	80.1	81.9	16.50	419.1	5.85	10	9			227.55	7.34	62
Kuala Trengganu, Trengganu HILL STATIONS.	83.8	70.4	77.1	86	66	77	75	79.8	81.2	12.57	319.3	4.03	19	14	3		213.85	6.90	58
Fraser's Hill, Pahang 4268 ft.	68.9	59.5	64.2	74	56	62	63	70.4	71.1	8.92	226.6	1.48	19	14	24		157.80	5.09	43
Cameron Highlands, Tanah Rata, Pahang 4750 ft.	71.2	55.0	63.1	76	44	65	62	68.1	68.6	6.95	176.5	2.16	13	10			170.75	5.51	46
Cameron Highlands, Rhododendron Hill, Pahang 5120 ft.	69.7	57.1	63.4	75	54	63	59			7.40	188.0	2.25	12	10			181.40	5.85	49

Compiled from Returns supplied by the Meteorological Branch, Malaya

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The Agricultural Economist.

THE Malayan Agricultural Journal.

APRIL, 1935.

EDITORIAL.

Malayan Agricultural Industries.

The importance of Malaya's major industry is self-evident, but there is a danger that in emphasizing the extent and value of the rubber industry the impression may be given that this country is a one-crop country and that in this respect it differs greatly from other tropical colonies and neighbouring countries. In point of fact, however, it is not true that the well-being of Malaya depends entirely upon her major crop, and a closer examination of the present position shews that this country is not inferior to most other countries in the diversity of crops.

From an acreage point of view we have in Malaya about 3,300,000 acres of rubber, but we also have 820,000 acres of food crops, 640,000 acres of coconuts, 60,000 acres of oil palms, 130,000 acres of fruits, 60,000 acres of spices, and over 40,000 acres of other crops—a total acreage of crops other than rubber exceeding 1,750,000 acres.

That the agricultural trade of Malaya, even excluding rubber, is of great value to the country is evident from the statements presented in an article on this subject which will be found in this number. The agricultural trade, it is shewn, is of a three-fold character: there is an import of agricultural produce to feed the population engaged in the rubber and tin industries, there is a local production for local demand and for export, and there is the local entrepôt trade centred in Singapore and Penang.

It is not claimed that Malaya has yet achieved that broadening of the basis of agriculture about which so much has been heard in recent years; but progress has been made, and the value to the country of these industries has increased.

Further emphasis on agricultural development is provided in other pages of this issue. In particular, attention is directed to the recent publication of this Department on the Oil Palm in Malaya which is likely to prove a standard work on the plantation oil palm industry for some time to come. Reference is invited to the review published elsewhere in this number, written by one who previously was closely in touch with this industry in Malaya and was a joint author of a book on this subject. The present publication gives a detailed account of the system under which the crop is grown and manufactured. The very high quality of oil which is obtained under plantation conditions reflects credit on those in various spheres of activity whose combined endeavours have

resulted in this success. We may expect largely increased crops from Malayan estates in the next few years, as many new areas have not come into bearing and other areas are not yet in full bearing.

Another subsidiary crop which is attracting increased attention is derris, known locally as tuba root. The value of this root as an insecticide is steadily becoming more widely realised. In the past, the value of the root has been very much taken for granted. Recent research in many countries has enabled the manufacturers of insecticides to make a more intelligent use of this product, resulting in greater efficiency in its application and a wider demand.

We have seen statements that derris is largely a product of the jungle. This is quite untrue of the product of Malaya, and we believe in fact, that practically the entire world supply is obtained from the cultivated plant. Moreover, increasing discrimination is made regarding the planting of varieties which are now known to be more efficacious as an insecticide, and exporters of the root now have considerable knowledge of the toxic value of the consignments they purchase for export.

An important advance in our knowledge of the insecticidal value of tuba has been made by the publication of a special bulletin of this Department, which is also reviewed in this number, on the toxic value of derris species.

Attention is also directed to the pineapple canning industry. In the last number of this Journal we included an account of the present methods used in the cultivation of this crop and in the canning of pineapples. An article in the present number gives an account of the trade in canned fruits in the United Kingdom, and shews the relative position of Malayan pineapples in competition with other canned fruits. We shall return to this subject in future numbers to point to the improvements which are possible by adapting the most recent advances of the science of canning to the local pineapple industry.

An article on the manufacture of coconut-shell charcoal which is also included in this number will serve to answer the many enquiries which have been received on this subject. The success of a crop often depends on the elimination of waste and the full utilization of by-products. Shell-charcoal has special properties which are not much in demand at the present time. On the other hand, local demand for charcoal can often be met from the coconut estate and the fact that the value of the average annual imports of charcoal exceeds \$700,000 points to the possibility of the extended use of the locally-prepared product.

Original Articles.

MALAYAN AGRICULTURAL TRADE IN 1934

BY

D. H. GRIST,

Agricultural Economist.

The volume and value of the agriculture trade of Malaya are apt to be overshadowed by the rubber industry, which accounts for a large proportion of the exports, and to be masked by the quantity and value of the large imports of rice. There are, however, other tropical agricultural products which contribute in no small degree to the agricultural wealth of Malaya.

The agricultural trade of Malaya is of four descriptions. In the first place, it is concerned with the preparation for market and export of agricultural products grown within its borders. The principal crops in this category are rubber, coconut products, pineapples, palm oil and kernels, tapioca, sago and arecanuts. Secondly, there is the trade, centred mainly in Singapore and Penang, which is concerned with the importation of agricultural products for consumption in Malaya. The chief crops of this description are rice, coffee, tea, groundnuts and oil, sugar, tobacco, livestock for food, meat, dairy produce, poultry and eggs. Thirdly, there is the trade, also centred largely in Singapore and Penang, which is concerned with the import of the agricultural produce to surrounding countries, its re-conditioning, blending and grading prior to distribution throughout the markets of the world. The most important crops included in this category are rubber, arecanuts, tapioca and sago, copra and various spices, condiments and essential oils. Lastly, there is the cultivation and marketing of Malayan crops within her own borders. Such crops include rice, coconut products, vegetables, fruit and poultry, and a large number of minor products. A computation of the value of this industry is impossible at present, as apart from rice production, statistics are not available of the extent of production. The value of the locally-produced rice in the last season 1933-34 was about \$16,000,000. Further, it is estimated that the consumption in Malaya of coconut products which are locally-produced, amounts to the equivalent of 100 nuts per head per annum, the value of which would be about \$4,000,000. Incomplete as are these figures, they demonstrate that local production for local consumption is in the aggregate a considerable source of wealth to the country.

The extent of the trade in products largely grown in Malaya for export may be judged from the net export figures of these products. The net exports of rubber, coconut products, pineapples, oil palm products, tapioca, sago and arecanuts in 1934 amounted to 735,000 tons valued at over \$230,000,000, of which rubber accounted for about 466,000 tons, valued \$208,000,000. The

figures for the previous year were 667,000 tons valued at over \$124,000,000, including 405,000 tons of rubber valued at over \$101,000,000. Thus, in 1934, the net exports of rubber exceeded those of the previous year by about 61,000 tons and the difference in value of the exports in the two years was nearly \$107,000,000, while the net exports in 1934 of the other agricultural products mentioned above were 269,000 tons valued at \$22,000,000, as compared with 262,000 tons, valued at \$23,000,000, in the previous year. It must be remembered that these figures relate only to the trade in the principal local crops. They demonstrate that production of such crops was higher than formerly in an unsuccessful endeavour to meet lower prices by an increase in production; the value of the greater crop of 1934, however, was less than in the previous year. Crops other than rubber therefore experienced a difficult year. The net exports of coconut products were 7,000 tons less in 1934 than in 1933—due in some measure to the replacements of copra by an increase in the production of coconut oil from 17,500 tons in 1933 to 25,500 tons in 1934. The value of net coconut product exports declined by \$3,000,000. Canned pineapple exports attained the new record of 66,633 tons, the value of which was nearly one million dollars greater than those of the previous year. The palm oil market experienced a most difficult year of low prices. Oil palm products, the net exports of which were 3,200 tons of kernels and 15,850 tons of oil, were valued at \$1,533,000 being but a few thousands greater than in 1933, although exports increased from 14,000 to 19,000 tons. Tapioca net exports fell from 26,380 tons in 1933 to 19,689 tons in 1934, a decrease of over 6,500 tons. Sago net exports increased by 3,000 tons from 5,467 tons in 1933 to 8,382 tons in 1934, and arecanuts by nearly 7,000 tons, 20,742 tons in 1933 as compared with 27,336 tons in 1934.

Consideration may now be given to the chief crops for consumption in Malaya—rice, coffee, tea, groundnuts and their oil, sugar, tobacco, livestock for food, meat, dairy produce, poultry and eggs. There are numerous other products of this description, but their effect on the position is not great. The outstanding fact in this connexion is that the quantity and value of the net imports of all these products—with the exception of meat—shewed a marked increase over the previous year. The total value of such imports was \$70,000,000 as compared with \$62,000,000. Had it not been for the fact that the price of rice was materially lower in the year under review than in 1933, the increase in the total value would have been much higher, for, whereas in 1933 Malayan net imports of rice were 433,000 tons valued at over \$24,000,000, in 1934 the imports were 20,000 tons greater for almost exactly the same cost. For the poorer people of Malaya, therefore, conditions in 1934 were much improved. The improvement in the rubber industry caused by the introduction of rubber regulation, in addition to the more satisfactory position of the tin industry, resulted in more work being available with an upward tendency in wages and an increase of imported labourers. These factors, together with

the low price of rice resulted in a greater purchasing capacity and therefore greater consumption of imported agricultural products. In view of the fact that some of these important factors did not apply in the first half of the year, and that the position in the edible oil industry has improved very recently, it is almost certain that net imports of all these products will shew a very considerable increase in 1935 over 1934.

There is, at the time of writing, little sign of any material advance in the cost of imported rice; in fact, in the main countries from which Malaya draws its supplies there are ample stocks of rice, and the prospects of the 1935 crop shew no abnormal features. Settled labour conditions should therefore continue in this country and the cost of living for the labouring classes should not be different from that of 1934.

The entrepôt trade of Singapore and Penang is also concerned with the re-conditioning, blending, grading and subsequent export of a number of crops, the most important of which are rubber, arecanuts, tapioca and sago, copra, various spices, condiments and essential oils. It will be noticed that certain of these crops have already been discussed under the category of Malayan produce; this is due merely to the fact that in such cases there is not only a large local production but an important trade in blending or grading for export, in which in some cases the Malayan product is upgraded by admixture of the better quality from other countries, while in other cases the converse applies.

To appreciate the extent of this trade it is necessary to examine gross imports and exports rather than net exports. The following figures illuminate the situation.

Table I.
Gross Imports and Exports of Certain Agricultural Products, 1934.

Product	Imports		Exports	
	Quantity Tons	Value \$	Quantity Tons	Value \$
Rubber ...	211,443	71,769,566	677,208	279,639,826
Arecanuts ...	38,563	2,975,138	65,899	5,473,078
Tapioca ...	7,136	554,151	26,825	2,406,735
Sago ...	48,860	1,436,471	57,242	2,390,238
Pepper ...	26,634	14,896,915	19,985	11,129,070

Table 2.
Annual Net Imports and Exports of Agricultural Products, Malaya.

Year	Net Imports*		Net Exports† (excluding rubber)		Excess of Imports over Exports (excluding rubber)		Net Exports of Rubber		Excess of Total Imports over Exports	
	Quantity Tons	Value \$	Quantity Tons	Value \$	Quantity Tons	Value \$	Quantity Tons	Value \$	Quantity Tons	Value \$
1923	643,000	101,600,000	206,600	43,100,000	436,400	58,500,000	181,700	227,200,000	254,700	168,700,000
1924	694,600	118,400,000	219,000	51,600,000	475,600	66,800,000	152,500	189,900,000	323,100	123,100,000
1925	744,800	133,100,000	218,700	48,600,000	526,100	84,500,000	161,800	519,000,000	364,300	434,500,000
1926	857,300	157,400,000	225,800	50,000,000	631,500	107,400,000	243,400	547,500,000	388,100	440,100,000
1927	956,000	167,400,000	207,500	42,700,000	748,500	124,700,000	190,700	351,400,000	557,800	226,700,000
1928	921,400	158,900,000	230,700	44,900,000	690,700	114,000,000	260,100	262,900,000	430,600	148,900,000
1929	1,004,500	171,700,000	254,700	44,000,000	749,800	127,700,000	418,000	353,700,000	331,800	226,000,000
1930	1,022,300	150,800,000	244,100	37,800,000	778,200	113,000,000	421,000	199,600,000	357,200	86,600,000
1931	883,200	92,100,000	241,200	26,700,000	642,000	65,400,000	393,600	99,300,000	248,400	33,900,000
1932	737,800	74,200,000	253,500	29,000,000	484,300	45,200,000	386,000	68,100,000	98,300	22,900,000
1933	770,000	66,700,000	265,700	25,600,000	504,300	41,100,000	405,300	101,400,000	99,000	60,300,000
1934	937,000	78,700,000	272,800	23,400,000	664,200	55,300,000	465,800	207,900,000	198,400	152,600,000

* Imports include coir cordage and fibre, mats and matting, padi and rice, coffee, tea, kapok, mace and nutmegs, pepper, ginger, groundnuts and groundnut oil, sugar, tobacco, vegetables, livestock for food, meat, leather goods, milk, butter, poultry and eggs, feeding stuffs for animals, ataps, cloves, castor oil, gingelly seed, fruits, and tapioca refuse.

† Exports include rubber seed, coconut products, copra, palm oil and kernels, canned pineapples, arcanuts, sago, tapioca, derris root, lides and skins, gambier, patchouli leaves and oil, mace and nutmegs.

The imports of rubber include 132,000 tons of wet rubber—sheet, scrap, lump and bark—which is treated in Singapore factories and exported as dry rubber. Sago imports include 7,000 tons of raw sago, which is manufactured to pearl and flour sago. The pepper position is somewhat curious. Imports exceed exports in spite of the fact that very large quantities are exported. The explanation would appear to be (a) Malaya consumes considerable quantities of pepper; (b) pepper is frequently decorticated in Singapore before re-export. The balance of this trade in 1934 is not typical of recent years. The large net imports indicate that Singapore stocks were increased, probably to be released early in 1935 when prices were extremely favourable. Malaya produces cloves, nutmegs and mace. The total imports of these products were 2,249 tons valued at \$556,082 and exports 1,664 tons valued at \$673,899. The imports therefore were greater than exports although the value of exports exceeded that of the imports. This difference is due to the fact that these products are imported, dried, graded and re-exported. In this procedure there is a loss of weight, although the value of the resultant product more than compensates for this.

An attempt has been made to assess the volume and value of Malayan agricultural trade in 1934 and to compare this trade with that of previous years. For this purpose, the quantity and value of net imports of all products have been added and compared with the sum of all products of which there is a net export. From this data a balance is struck of the volume and value of the Malayan agricultural trade in the country. For the year under review net imports amounted to 937,000 tons valued at \$78,700,000 (including rice 453,000 tons valued at \$24,000,000). Net exports (excluding rubber) were 273,000 tons valued at \$23,400,000. Malayan agricultural trade, therefore, of crops other than rubber and rice still shows an excess of imports over exports of 211,000 tons, valued at \$31,300,000, accountable mainly to imports of livestock, dairy produce and tobacco.

It must be remembered, however, that these imports are in a measure to feed the large population which, both directly and indirectly, is connected with the rubber industry. Including all imports and all exports of agricultural products a truer balance of the Malayan agricultural trade is obtained. This balance shows that Malayan imports of agricultural products exceeded her exports by 198,000 tons, but that the value of agricultural exports exceeded imports by \$152,600,000. As shewn in Table 2 this balance is the most favourable since 1929. Another encouraging feature is the improvement in net exports of produce other than rubber. The 1934 total of 272,800 tons is the greatest yet recorded, and with the improvement of general trade conditions which appears possible, a considerable increase in the value of such exports would appear to be a reasonable anticipation for the year 1935.

THE TRADE IN CANNED FRUITS IN THE UNITED KINGDOM*

BY

H. A. TEMPANY,

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The trade in canned fruits in the United Kingdom comprises (a) fruits, grown and canned in the country and (b) fruits canned in other countries and imported. To this must be added a small but increasing trade in fruit salad made from imported and home grown fruit in cans which are opened, mixed, recanned and reprocessed in England.

The output of canned fruit in England for the year 1932 was estimated by the Ministry of Agriculture to be approximately 689,000 cwts. Figures for 1933 are not available but it appears that it is unlikely that they would show much increase over the 1932 figures.

In Scotland there is apparently a production of between 10,000 and 20,000 cwts. For the same year exports of canned and bottled fruits amounted to 9,792 cwts., so that in round figures it would appear that the consumption of home-grown canned fruits in the United Kingdom amounts to approximately 700,000 cwts.

The imports into the United Kingdom of canned and bottled fruits have greatly increased in the past ten years. In 1924 imports were 2,100,000 cwts., in 1932 they had increased to 3,203,000 cwts., falling in the following year to 3,018,000 cwts. The present consumption of canned and bottled fruits in the United Kingdom therefore amounts to about 3,800,000 cwts. per annum.

The chief varieties of fruits canned in Great Britain are those which are not, as a rule, imported in large quantities. Peaches, pears, apricots and pineapples account for five-sixths of the imports and most of the balance is made up of canned fruit salad, the chief constituents of which are also peaches, pears, apricots and pineapples.

British canned fruits comprise strawberries, raspberries, currants, blackberries, gooseberries, plums, greengages, cherries and apples.

With the exception of apples these are known as soft fruits; the imported kinds are known as hard fruits.

The British canning industry has developed during the last ten years; in 1923 the production was very small and was confined to four factories, while at present there are seventy-four factories operating in England and the output has increased tenfold in the last seven or eight years.

The industry has been fostered and assisted by the Ministry of Agriculture, and the Canning Research Station at Campden has materially helped development.

* The statistical data are taken from the Report on canned and dried fruit supplies in 1933 prepared by The Imperial Economic Committee.

It is obvious that a great increase in the consumption of canned and bottled fruits in the United Kingdom has occurred and that the development of the British canning industry has not so far led to any curtailment in the consumption of imported fruits.

The opinion has been expressed that, owing to the difference in their nature, there is no real competition between British and imported canned fruits, the demand for imported hard fruit being independent of the demand for soft British fruits. The opposite view has also been expressed by those engaged in the British canned fruit trade, who consider that the education of the public taste to prefer British canned soft fruit to imported canned hard fruit is merely a question of the energy and money that is put into the campaign for popularising it.

It is difficult to express an opinion as to which view is correct, but there is no doubt that a large trade has been built up in British canned soft fruit of which the consumption is now about equal to that of Malayan canned pineapples; the trade itself is well organised and well run and large sums of money are being expended on advertising.

British and Imperial canned fruits now receive substantial protection under the Ottawa Agreements whereby canned fruits from non-British countries are charged 15 per cent. *ad valorem* in addition to the duty on the sugar content, while British and Imperial canned fruit pay no duty except on the sugar content. The protection afforded applies equally to British and to Imperial and Colonial produce and Malaya accordingly benefits thereby.

As already stated, the imports of canned fruits into Great Britain consist almost exclusively of peaches, pears, apricots and pineapples.

These on the mean for four years 1930 to 1933 inclusive, comprised:—

Pineapples	...	...	...	27.8 per cent.
Peaches	...	...	...	24.0 " "
Pears	...	...	...	23.7 " "
Apricots	...	...	...	7.7 " "

Of the imports of canned pineapples Malaya accounts for by far the largest amount.

The following three tables show the imports of canned fruits from various countries for the past six years, in thousands of hundredweights.

It will be seen that on the whole there is a steady tendency towards increased consumption. There was on appreciable drop in imports in 1933 which was almost entirely accounted for by the decrease in imports of Malayan canned pineapples.

The following remarks on the import trade in canned pineapple are abstracted from the Report on Canned and Dried Fruit Supplies in 1933, prepared by the Intelligence Branch of the Imperial Economic Committee.

"In 1931, canned pineapple comprised 26.2 per cent. of the total imports of canned fruit preserved in syrup compared with averages of 28.8 per

Imports of Canned Pineapples into the United Kingdom.
(in thousands of hundredweights)

Exporting Countries	1928	1929	1930	1931	1932	1933
Malaya ...	515	648	608	676	891	711
Union of South Africa ...	12	13	4	5	4	4
Other Empire Countries ...	1	—	2	3	17	19
United States ...	48	58	40	35	32	22
Hawaii ...	49	44	38	47	19	25
Other Foreign Countries ...	5	3	6	3	2	12
Total Empire Countries ...	528	661	614	684	912	734
Total Foreign Countries ...	102	105	84	85	54	59
Grand Total ...	630	766	698	769	966	793

Imports of Canned Fruits other than Pineapples into the United Kingdom.
(in thousands of hundredweights)

	1928	1929	1930	1931	1932	1933
Total Empire Countries ...	212	182	278	237	310	417
Total Foreign Countries ...	1,767	1,772	1,454	1,940	1,927	1,808
Total ...	1,979	1,954	1,732	2,177	2,237	2,225

cent. and 27.3 per cent. for the periods 1921-5 and 1926-30 respectively. In 1930, in spite of increases in the quantities of other classes of fruit, the percentage of pineapple in the total rose to 30.2 per cent., but in 1933 the percentage receded to 26.3 per cent. or almost the same as in 1931". "There have been no significant alterations in the countries of supply in recent years although the growing importance of Australia and the increasing imports from Japan, probably of Formosan origin, are worthy of note."

Total Imports of Canned Fruits into the United Kingdom.
(in thousands of hundredweights)



		1928	1929	1930	1931	1932	1933
Empire Countries	...	740	843	892	921	1,222	1,151
Foreign Countries	...	1,869	1,877	1,538	2,025	1,981	1,867
Grand Total	...	2,609	2,720	2,430	2,946	3,203	3,018

"Empire Countries continued to take a large and growing share of the trade and in 1932 accounted for over 94 per cent. of the trade of which all but 2 per cent. came from British Malaya. In 1933 there was a setback from this very high percentage to 92 per cent., British Malaya alone supplying 90 per cent."

"The supply of imports from South Africa has recently declined to small proportions while a similar decline occurred in supplies from Hawaii, between 1928 and 1933 the share of Hawaii in the trade having declined from 15½ per cent. to less than 6 per cent. In both cases the downward tendency may have been the result of a temporary fall in the demand for a relatively high priced article due to the depression, though the improvement which has taken place in the quality of the Malayan article is probably an important contributory factor."

"For some years only negligible quantities of canned pineapple were received from Australia, but there was a revival in 1932 when some 10,500 cwts. were imported and the total was further increased to 15,900 cwts. in 1933.

"Small consignments have also been received from Fiji (1,200 cwts. in 1933) and from Mauritius (1,300 cwts. in 1933). Imports from Japan were very small until 1932 when 8,900 cwts. were registered".

The Malayan canned pineapple maintains its place on the market largely because of the very low prices at which it is sold. At the time of writing 1 lb. tins of Golden Yellow cubes in slices are being retailed in shops at 4½d each while the lower grades can be obtained at 3½d. In competition with this, Australian canned pineapple is retailing at 11d. to 1s 1d. for a 2 lb. tin and Japanese from 5d. per lb. tin. Imported peaches and pears retail at from 8d. to 1s. per lb. tin, while home grown soft fruit retails at slightly higher prices. The cheapest canned fruit, other than pineapple, is probably British cherries retailing at 5d. per lb. tin, but these very cheap lines represent low quality produce which it is not considered desirable to encourage.

The following table shows the wholesale prices for various kinds of imported canned fruit from 1929 to the end of 1934. These data have been collected and supplied through the courtesy of Mr. W. C. Knox of the Imperial Economic Committee. The prices are wholesale merchants' prices duty paid in England and accordingly represent the rates at which the various lines are selling. The most interesting point is the manner in which the low prices for Malayan pineapples are being challenged by competitors at more or less similar rates for Australian peaches and pears. Definite information concerning wholesale prices for Australian pineapple is not at present available but it is understood that this fruit occupies a position intermediate between Golden Malayan and Hawaiian standards *i.e.* with the wholesale price of the former ranging between 7s. and 8s. per dozen 2½ lb. tins (duty paid, landed) and the latter from 10s. to 11s. the Australian product would be in the region of 9s.

Malayan pineapples come on the market in two grades *viz* :—Golden and G.A.Q. and in cubes, or in slices. The best qualities of Malayan pineapple are uniformly Golden Yellow in colour and have a marked flavour; they differ from Hawaiian and Australian pineapples in that the latter are of a pale lemon or honey colour and have somewhat less marked flavour, although this is considered by the trade to be an advantage; they are, moreover, less fibrous than the Malayan product.

At present there seems little to distinguish the best Australian brands of canned pineapple from the Hawaiian article, although in the trade it is considered to be somewhat inferior and is regarded as flat and sweet.

The difference between the Malayan fruit and that from other countries is due to the variety.

Among the cheaper grades of Malayan produce there is still much of poor quality comprising unripe fruit of inferior flavour and unattractive appearance. In all other countries in which canned fruit is produced, increasingly strict attention is paid to the quality of the produce packed, and, while it is admitted that a marked improvement has taken place in the quality of the Malayan product, the standard is still below what is required in other and competing industries and must react against the Malayan product in the various markets.

A striking feature of the present position is the rapid advance which Australian canned fruit of various kinds has made in the English market. As the statistics which have been given show, imports thereof have increased very greatly of late. The quality of the produce is uniformly high and the prices at which it is being retailed are attractively low. In this respect the favourable character of the Australian exchange rate has no doubt had an effect. The Australian Government is assisting development by excellent displays of canned fruit at various trade shows.

Wholesale Prices of Canned Fruits.
(per doz. 2½ lb. cans - except Malayan cubes).

Period	Apricots		Peaches		Pears		Pineapples			
	Californian 2½s	Australian 2½s	Californian 2½s	Australian 2½s	Californian 2½s	Australian 2½s	Hawaii 2½s	S. Africa 2½s	Malayan Golden 2½s	Malayan Cubes 1½s
September 1929	10.9 p	10.6 p	10.3 p	10.6 p	12.6 s	12.3 s	12.6 s	12.6 p	6.6 p	—
September 1930	10.9	9.6	9.9	10.0	12.6	10.6	14.0	—	8.6	—
Av. Year 1931	8.5	8.2	8.0	7.8	9.6	9.2	11.7	11.6	7.9	—
Av. Year 1932	9.9	9.10½	9.1½	9.4½	10.7½	10.4½	12.6	11.9	7.8	4.4
1st Quarter 1933	9.6	9.10½	9.3	9.6	10.6	10.4½	13.6	11.9	7.6	4.0
2nd " "	9.6	8.9	9.4	8.3	10.6	9.3	13.6	11.6	7.6	3.11
3rd " "	9.6	8.9	9.0	8.3	10.2	9.3	12.10	11.6	7.5	3.10½
4th " "	9.2	8.9	8.7	8.3	9.4	9.3	12.6	11.6	7.4	3.10½
1st Quarter 1934	8.1	8.3	8.0	8.3	8.6	9.3	11.10	1.6	7.4	3.10
2nd " "	8.4	7.11	8.0	7.3	8.6	8.0	11.6	11.3	7.1	3.9½
3rd " "	8.9	7.9	8.3	7.3	9.0	8.0	11.8	—	7.6	3.10
4th " "	10.0	7.9	8.6	7.3	9.6	—	12.0	—	7.3	3.9

It is anticipated that an increase in the production of canned fruits in South Africa is not unlikely to occur in the course of the next few years. As the trade in all canned fruits is to an extent interdependent these factors are likely to affect the market for Malayan canned pineapples.

There has been a marked tendency for prices for all kinds of canned fruits to fall during the past few years. This is partly due to general trade depression and partly to increased competition as a result of the greatly increased production. With the stimulus of cheap prices the British market has expanded to take the increased volume of domestic production and of imports, but producers everywhere complain that the prices which they are able to obtain are barely sufficient to prove remunerative. In these circumstances Malayan pineapples are regarded in many quarters as having a directly "bearing" effect on the whole market for canned fruit by reason of the low prices at which they are currently sold.

There is apparently little doubt that a rise in the market price for Malayan canned pineapples would be welcomed by the producing side of the British industry, in the belief that it would be reflected in an upward trend in the prices of all other varieties of canned fruit. On the other hand, this view is not shared by distributors who fear that it would spoil the market. The position has directed attention to the conditions under which Malayan canned pineapples are produced. Much information on this score has filtered through during the past few years and little of it to the credit of the industry.

Moreover the situation is by many considered to be adversely affected by the selling methods which prevail in relation to Malayan canned pineapples and which cause destructive competition. Attention has been repeatedly drawn to this point but as yet the system has not been sensibly modified.

Both in Britain and elsewhere increasing care and attention are being paid to methods of production of canned fruit; considerable efforts are being made by organised selling arrangements and by judicious advertising to improve the market. In consequence, British and Dominion producers cannot be expected to view with favour competition from an industry which they regard as working under conditions markedly inferior to those in the United Kingdom and with selling arrangements which are regarded in many quarters as tending to keep prices down.

As against this it has been claimed that the existing system of distribution of Malayan pineapples combined with the low price of the product causes it to reach sources of consumption which other classes of canned fruit have so far been unable to approach.

There is reason to believe that in spite of the great increase in the consumption of canned fruit in the United Kingdom, the market has by no means reached saturation point, and during the current year the imports of Malayan canned pineapples have already considerably exceeded the imports in the corresponding period of 1933, and have all been absorbed without difficulty.

There are, moreover, considerable potential markets for canned pineapples outside Great Britain, notably in Canada, where the trade is expanding rapidly; the displays made by the Malayan Information Agency at the Canadian National Exhibitions have naturally assisted in this.

A strong case exists for further efforts to popularise the product by judicious display and advertising.

The situation is therefore favourable inasmuch as the Malayan industry possesses established markets and the demand for canned fruit is still increasing. It is unfavourable because of (a) the increasing competition from other forms of canned fruit (b) the absence of standardised grading for and the unreliability of the Malayan produce and (c) the fact that the knowledge that the Malayan industry is conducted on lines which cannot compare with those maintained in competing industries elsewhere, is now widespread.

One of the results of the period of depression has been a drastic overhauling of the canning industries in the important producing countries, and it seems evident that they will emerge from these difficult times on a more keenly competitive basis than ever before. Hawaiian and Malayan pineapples are sufficiently dissimilar to preserve even yet the distinction between the markets for the two products, but in planning for the future it would certainly seem inadvisable to count on this distinction as a permanent feature; with Australia, South Africa and Formosa also in the field and moreover on a much more nearly competitive basis, the need for reorganisation becomes even more pressing. This is quite apart from the competitive influence of other fruits which seems likely to grow stronger if and as the tastes of the consuming public change.

Dealing as it does with an article of domestic consumption the product is in a different position from raw materials. Recent legislation provides the means for bringing about some improvement, but further remodelling of the industry is needed, so as to bring its methods into line with accepted practice elsewhere.

A difficulty lies in the comparative unawareness of those concerned with the industry of the methods employed elsewhere. In order to provide some information on this point, in a subsequent number of this journal a summary of information concerning the British canning industry will be given.

CHARCOAL MANUFACTURE FROM COCONUT SHELL

BY

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When coconut shell is heated in a closed space without the presence of air, decomposition ensues, resulting in the formation of charcoal and in the evolution of large quantities of volatile products which can be recovered only by using an efficient retort and condensing plant. If charcoal alone is required but no volatile by-products, it is sufficient to carbonise the shells in a stack or pit.

Methods of Manufacture.

The shells used require a certain amount of selecting, as pieces with husk adhering yield a tarry or dirty product. Thin shells should be discarded and only shells from fully matured nuts, and those that have a clean bald surface selected.

The normal method of charcoal manufacture practised in Malaya is the age-old method of burning in turf or mud-sealed heaps. The enclosed heap is fired and when the shells are thoroughly burning, the supply of air is cut off, carbonisation proceeding without further combustion. This primitive method is capable of producing good charcoal.

A tall stake is driven into the ground and shells are built round it to a height of about 4 feet. The pile is then covered with earth and grass which is damped. The stake is removed and fire inserted after which the heap is sealed and allowed to burn for 12 hours. In the morning the pile is doused with water and allowed to cool off.

On certain estates, the process is simplified still further by merely throwing water on a large, burning, uncovered heap of shells. This results in a charcoal which is not uniform, and which is of an inferior quality.

In Ceylon, where in coconut districts it is possible to excavate without reaching water, pits from 4 to 6 feet deep are filled to the top with shells which are then covered with green fronds and damp turf, sealed with earth and the shells fired.

There are two alternative methods of procedure. In one fire of shells is started at the bottom of the pit, more shells are added until the pit is full and when these are well alight the fire is sprinkled with water until the flames have died down. The glowing mass is then covered with damp fronds, turf and earth, and left for 12 hours. Alternatively, a large pit 6 feet deep and 8 feet in diameter is dug; a hollow bamboo pipe is placed vertically in the centre and the pit is filled to ground level with shells. Paraffin is poured down the pipe and lit, after which water is sprinkled over the burning shells. They

are then completely smothered with wet fronds, sacking and earth and left overnight.

Requirements and Specification.

The distillation of creosote and other by-products from the shells must be practically complete as, for use in cooking, the object is to obtain a smokeless fuel. For chemical purposes, the charcoal will not act as an absorbant if the pores of the charcoal are clogged. In the production of producer gas for use in suction gas engines, the object is to obtain maximum gas output and to keep the fouling of the scrubbers and filters to a minimum.

A London firm of importers gave the following specification :—

- (a) Not more than 15 per cent. volatiles.
- (b) Not more than 10 per cent. moisture.
- (c) Pieces to be of a size, not less than 10 per cent. remaining in a mesh with 1 inch holes; nor more than 5 per cent. passing through a mesh with $\frac{1}{4}$ inch holes.

Requirement (c) is severe for there may be considerable damage and breakdown during shipment.

Properties of Coconut Charcoal.

An actual sample of Malayan charcoal received which contained 25 per cent. moisture, gave 5,730 calories as the calorific value. This in terms of dry charcoal, is equivalent to a gross calorific value of 7,640 calories.

Pieces of charcoal of good quality are uniformly dark, and free from adherent dirt due to husk. When dropped on a stone floor such pieces emit a clear bell-like ring and the broken edges shew a black lustrous surface with a sharp conchoidal fracture. A badly burnt piece will emit a dull sound, and its broken surface is dull, dirty and irregular. An overburnt piece is very thin and has a smooth wavy indented edge beginning to curl. Thin overburnt pieces are very brittle, and are therefore unsuitable for inclusion for export as they are quickly reduced to dust.

Great care, experience and skill are required if the necessary high quality is to be obtained and slight misjudgment may result in a mixed mass of woody half-burnt charcoal, as a result of incomplete combustion, or a low yield of thin brittle copra through over-ventilation or over-burning. It will be appreciated, therefore, that the training of the operators may be a lengthy process and many batches of charcoal may be spoiled before the necessary skill and judgment are acquired.

Yields.

The theoretical yield of shell charcoal is half the weight of the coconut shell. In practice, 25 per cent., or even considerably less, is obtained according to the efficiency of production and the thickness of the original shell.

An approximate formula for estimating the number of shells required per picul of charcoal (133 1/3 lbs.) is four times the number of nuts required per picul of copra *e.g.*

250 nuts per picul of copra = 1,000 shells per picul of charcoal.

If shells are also to be used as fuel in the copra kiln, it would not be safe to assume that more than 30 per cent. of the total shells would be available or suitable for conversion into charcoal.

Cost of Production.

In one instance, charcoal is now being manufactured and bagged on contract at the rate of 28 Straits cents per picul. Three bags are required per two piculs of charcoal and this together with handling and road transport brings the total cost to about 60 cents per picul f.o.b.

The Conference tariff on coconut charcoal is about 72s. per long ton ex ocean port, less 10 per cent. deferred rebate. Cost of production, above, is equal to about 25s. per ton. Selling charge, insurance etc. bring the total c.i.f. cost to about £5 per ton.

In view of the possible local extras not included above, an all-in cost of £6 per ton should be allowed.

The Market.

In 1931, the price offered by European buyers was between £10 and £11 per ton, but a more recent quotation was as low as £7 per ton delivered. Demand has hitherto been neither large nor sustained. In Ceylon, there is a considerable industry, the charcoal produced being either sold in the villages for kitchen use; for use in laundries; for conversion into producer gas; or for consumption in smelting works in Colombo. In Malaya, the bulk of the charcoal used for cooking purposes is obtained from *bakau* wood and the local demand is somewhat limited.

**THE ASSOCIATION OF THE PYRALID MOTH,
TIRATHABA LEUCOTEPHRAS MEYR.,
WITH THE FRUIT BUNCHES OF THE NIPAH PALM,
(NIPA FRUTICANS)**

BY

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Government Entomologist.

Several fruit bunches of the nipah palm were received in May, 1934 by the Entomological Division of the Department of Agriculture requesting information as to the agent responsible for the presence of a gelatinous exudation and asking for recommendations to prevent its formation, since a considerable mortality of female inflorescences was considered to occur.

The examination of these fruit bunches showed that two were bored by caterpillars but since the others contained no caterpillars and showed no signs that caterpillars had been present the writer visited the area to make further observations. During this visit, the writer observed that most female heads of the palms, more especially underneath, showed varying quantities of exudation with which insects were not always associated and remarked that dead and immature heads were not numerous and that very few heads failed to reach maturity. After some discussion with the Manager, it was finally arranged to conduct an investigation to ascertain (a) whether this Pyralid moth was primary (b) whether it could be controlled by an insecticide (lead arsenate) and (c) if so, whether it prevented the development of the female head to such a degree as to warrant the cost of spraying.

In order to obtain information on the above points, one hundred and twenty female inflorescences, which were artificially pollinated on the 23rd June, 1934, were selected. Block I of twenty inflorescences was the control and Blocks II, III, IV, V and VI, each of twenty inflorescences, were sprayed with lead arsenate on June 25th, Blocks III, IV, V and VI on July 2nd, Blocks IV, V and VI on July 9th, Blocks V and VI on July 16th and Block VI on July 23rd.

Between June 23rd and November 1st observations on these inflorescences were recorded on fourteen occasions and at the time of the last inspection they were specially examined to ascertain when they would be ready for the "gonchang".*

The record shows that out of a total of one hundred and twenty, eighty-three spathes were ready for the "gonchang" before or by November 1st, 1934, twenty-five would be ready about December 1st, 1934, ten were considered immature and two inflorescences were recorded dead. Of the eighty-three, seventy-five fruit bunches were without or with slight exudation and eight showed considerable exudation, one of which also revealed the presence of a

*"Gonchang" = binding and heating to accelerate juice exudation.

Record of Observations.

1. Number of spathes ready for the gonchang		2.	3.	4.	5.	6.
Before or by November 1st.	about December 1st.	Number of immature spathes	Number of fruit bunches without or or with little exudation	Number of fruit bunches with consid- erable exu- dation and loose seeds	Of those in column 4, number with indications of the presence of caterpillars	Number of dead female heads
Block I. Control.						
9	6	— — 5	6 3 3	3 3 2	0 0 2	0 0 0
Block II. (Sprayed once)						
12	— 5	— — 2	11 5 1	1 — 1	0 0 0	1 Cause of death unknown not insect
Block III. (Sprayed twice)						
14	— 4	— — 2	12 3 1	2 1 1	1 0 1	
Block IV. (Sprayed thrice)						
15	— 5	— —	13 4	2 1	0 0	
Block V. (Sprayed four times)						
18	—	— 1	18 1	—	—	1 dead with cater- pillar
Block VI. (Sprayed five times)						
15	5		15	— 5	1 —	

caterpillar; of the twenty-five, fifteen were without or with slight exudation, ten, one of which with indications of the presence of a caterpillar, had considerable exudation, of the ten, six were without or with slight exudation, four with considerable exudation and of this number three showed indications of the presence of caterpillars. Of the one hundred and twenty inflorescences, only six, one of which was recorded dead, showed the presence of a caterpillar. On these records this moth is not considered to be of economic importance to the nipah palm inflorescence.



Some association, however, between considerable exudation and caterpillars seems to exist and it is suggested that caterpillars when present are responsible for stimulating the exudation. On the other hand, eighteen fruit bunches showing considerable exudation were without signs of the presence of caterpillars which indicates that the caterpillar is not primarily responsible for its formation.

In addition to this Pyralid caterpillar, the weevil, *Diocalandra frumenti*, is more frequently, but not always, associated with the exudation from the female heads and possibly when present promotes an increased flow of juice. It should be mentioned, however, that by far the majority of female heads at their bases, if carefully examined, show slight exudation with which neither the Pyralid caterpillar nor *Diocalandra frumenti* is always associated and for which another agent is undoubtedly responsible. Small undeveloped fruits are found at the base of the inflorescence, and since all their flowers may not have been pollinated or the plant may have been unable to mature all its fruits, it is suggested that the exudation may be produced as a result of the plant endeavouring to discard the unpollinated fruits or, if pollinated, to obtain maximum growth of other fruits.

On this nipah area the male flowers adjacent to the female inflorescence are removed by a knife for the control of the Anthomyiid fly, *Phaonia corbetti* Mall., and it was thought that, in the process of removing the male flowers, the young female stalks and inflorescences may be injured. It was therefore decided to ascertain if more exudation was formed by deliberately cutting the female inflorescence and its stalk at the time when the male flowers were removed. For this purpose twenty female inflorescences were slightly cut. These inflorescences were artificially pollinated on July 16th, 1934, and inspected nine times, the last occurring on December 7th, 1934. During the course of these inspections, four inflorescences were observed with considerable exudation and loose immature fruits at their bases. On the last inspection, sixteen spathes were considered ready for the "gonchang", three for the "gonchang" about January 7th, 1935 and one was recorded dead, cause—"not insect". *Diocalandra frumenti* was associated with the exudation on some inflorescences but the caterpillar was not observed. As a result of this experiment slight cutting of the female inflorescence at the time of the removal of the male flowers would not appear to increase the exudation nor to prevent the maturation of the female heads.

Summary.

(1) The caterpillar is only present in a comparatively few female inflorescences and, when present, rarely, if at any time, prevents the maturation of the fruit bunches.

(2) The moth appears to be secondary and is probably attracted to the exudation from the female inflorescences.

(3) The weevil, *Diocalandra frumenti*, although more prevalent than the caterpillar, is undoubtedly secondary. This insect was not present on all the nipah inflorescences showing exudation, and observations on its behaviour towards other palms demonstrate that it is attracted to fermenting sap.

(4) No information as to the value of spraying with an insecticide was obtained owing to the fact that very few inflorescences in the control block contained caterpillars.

(5) The exudation may be due to the plants endeavouring to discard undeveloped fruits or to allow of maximum development of the other fruits in a bunch. On the other hand, the exudation may be due to a mechanical agent, such as wind, which at times undoubtedly causes considerable swaying of the inflorescence.

(6) It would be interesting to ascertain if after the "gonchang" the quantity of nipah juice produced from those spathes, the inflorescences of which showed considerable exudation, is less than from the inflorescences showing slight or no exudation.

Miscellaneous.

THE GOVERNMENT RICE MILL AT TEMERLOH, PAHANG

BY

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State Agricultural Officer, Pahang.

History.

The policy of the Government is to encourage padi cultivation in order to render Malaya less dependent on imported rice. This policy has been vigorously pursued in the State of Pahang and has resulted in a larger area under this crop and increased yields. In certain parts of the State, production has exceeded consumption, and at the same time transport difficulties have rendered the surplus padi unsalable at remunerative prices. It was decided that the only practicable solution of this problem was the establishment of local rice mills of a suitable capacity to deal with the surplus crop in the immediate vicinity of each mill, since the rice so made could then be transported more economically than the unhusked padi.

The objects were to secure to growers a better price for their padi and to ensure a more even distribution of the locally-produced rice supply throughout the State, any surplus being available for export to other parts of the Peninsula.

Temerloh was selected for the site of the first mill as it is accessible by river, road and railway, is the centre of a large Malay agricultural community, and is a District headquarters.

Erection of Buildings and Mill.

Levelling of building sites commenced in September 1934 and all buildings were completed in November of that year. The work of erecting the mill itself commenced in the latter month and the first trial run was made on 21st December, 1934. This trial run shewed that numerous additions and alterations to the plant were necessary. These were completed at the end of February 1935. Minor improvements, such as padi chutes and bins, have still to be completed.

The engineers for the erection of the mill were Messrs. Guthrie & Co. Ltd. The buildings were erected by the Public Works Department.

Description of Mill and Buildings.

The mill, constructed by W. McKinnon & Co. Ltd., is of the self-contained type, with a capacity of 7 cwt. (or about 6 piculs), of white rice per hour, from about 10 piculs of padi. The oversize measurements of the mill are 16 feet

6 inches by 20 feet 6 inches. It is driven by an 18/21 h.p. Petter crude oil engine.

The machinery is installed in a building, 30 feet by 40 feet, constructed of galvanised sheet iron, with a steel frame-work, a roof of Abbest-cement roofing material and a concrete floor.

Annexes are provided in the mill building for the engine and for a small store for fuel. The padi store, which is bird and rat proof, is constructed of similar material to the mill building; the dimensions are 50 feet by 25 feet by 12 feet.

Other buildings consist of a garage and lorry-driver's quarters, latrine, and bath house. A padi-drying floor of cement, 70 feet by 30 feet, is provided on the hill above the padi store.

Operation of the Mill.

The padi is fed onto a riddle which separates any stalks, stones and other impurities. From this it passes into the first elevator—which is of the bucket type—which discharges it by gravity into a feeding tank, through a box containing magnets which remove any fragments of metal, and finally into the shelling cone where the husk is removed.

The shelling cone consists essentially of two discs covered with a special grinding compound; the upper disc is stationary, but the lower one revolves at a high speed. The padi passes between the two discs and after hulling, is discharged at the edges. The hulled rice, known as brown rice, still mixed with the husk and bran, is discharged into the second elevator which carries it to the second riddle where the broken rice with a small proportion of the husk-bran is separated and is known as cargo bran. The remainder passes to the winnower where all the husk is drawn off by a powerful suction fan.

The brown rice which may still contain some unshelled padi, but now free of the husk-bran, is led to the padi separator, which is worked to and fro by an eccentric drive from the main shaft. This machine separates the unshelled padi from the brown rice, the former passing back to the first elevator and thence through the shelling cone, the latter to the third elevator and then by gravity to the polishing cone where, by passing between a revolving emery disc and a stationary wire cloth, the outer layer of the brown rice is removed. The fine bran is drawn off by a suction fan, the coarser bran being swept out by revolving arms.

The polished rice passes into the fourth elevator and to the rice grader, over a second winnower, and is finally discharged through pipes to the bagging board in three grades; *viz.* No. 1 white rice, No. 2 large broken, and No. 3 small broken.

The entire process is automatic and continuous from the feeding of the padi onto the first riddle to the bagging of the final products.

Management and Working of the Mill.

The mill is controlled by a committee consisting of the District Officer, Temerloh, as Chairman, the State Agricultural Officer, Pahang, the Malay Agricultural Assistant, Pahang South, and the Manager of the Rice Mill as Secretary. The mill is being run on a strictly commercial basis.

The permanent staff of the mill consists of a manager, miller, padi chooser, engine driver, cleaner (who is being trained as an assistant miller) and four or five daily padi labourers. The entire staff are Malays with the exception of the miller who is Chinese.

The padi is purchased at selected centres throughout the District at prevailing rates—at present \$1.80 per picul. It is transported to the mill in lorries hired by the Committee. The rice is sold ex-mill.

Capital Costs.

Final figures of capital costs are not yet available, as roads are at present incomplete and other minor works are necessary. The following figures, however, shew that the total capital is about \$20,000.

McKinnon's self-contained rice mill; second-hand 18/21 h.p.		
Petter crude oil engine. Delivery to site and erection ...		\$ 8,613
Milling and engine room: padi store with erection ...		6,242
Drying floor, garage and driver's quarters, latrine, bath house		2,769
Estimated costs:		
Road, levelling of building sites and clearing ...	...	1,000
Additions and alterations to plant and contingencies ...	...	1,000
Silos for bulk storage ...	... ..	500
		<hr/>
		\$20,124

Opening Ceremony.

The opening ceremony was performed by His Highness the Sultan of Pahang on 28th February 1935, in the presence of a large gathering of officials and unofficials including the Hon'ble the British Resident of Pahang, the Hon'ble the Adviser on Agriculture and all the Pahang State Heads of Departments.

At the conclusion of the opening speech by His Highness, the Chief Kathi offered up the customary prayers and His Highness then unlocked and entered the mill building. His Highness poured the first gantang of padi into the feeding hopper and the machine was set in motion.

Following the opening ceremony, there was an official tiffin at the Temerloh Club, at which speeches were delivered by the Hon'ble the British Resident and the Hon'ble the Adviser on Agriculture, and a reply thereto by the District Officer on behalf of the Mill Committee.

KEDAH PADI SHOW.

An innovation in shows was held at Alor Star, Kedah, on 13th and 14th March, 1935, when a successful padi show took place, the exhibits consisting entirely of selected high-yielding strains of padi which had been grown by planters from seed distributed by the local Department of Agriculture.

The large weekly-fair building, which was kindly lent for the occasion, was used to stage the exhibits which were placed on benches on two tiers throughout the large building and arranged in sections corresponding to the twelve Circles, or Divisions, into which the padi areas of North and Central Kedah are divided.

The Show was officially opened by His Highness the Sultan of Kedah in the presence of a distinguished company which included His Highness the Regent of Kedah, the Hon'ble the British Adviser, Kedah, and the Hon'ble the Adviser on Agriculture, Malay States.

The Principal Agricultural Officer, Kedah, (Mr. W. N. Sands) delivered an address of welcome to His Highness, which was translated into Malay by the Assistant Principal Agricultural Officer (His Highness Tunku Yacub bin Sultan Abdul Hamid). He said, *inter alia*,

"Kedah possesses a soil and climate as well as an agricultural population unequalled in Malaya for the production of large crops of first-class padi, and at the present time, the State produces about 42 per cent. of the total Malayan annual output of it. This high percentage can, it is confidently believed, be maintained and possibly increased, not only by bringing under cultivation and draining areas of suitable land, but by increasing the yields of areas already cultivated; and the best means of accomplishing this, apart from manuring, is the planting of selected high-yielding strains of padi, such as are exhibited here today. These selected strains are the result of careful scientific breeding work extending over several years. The majority of these strains have been bred at Telok Chengai Station from popular local varieties, whilst the remainder consist of some of the best forms which have been selected in Malacca and in Krian, Perak. It is estimated that these selected varieties of padi will yield under similar conditions at least 20 per cent. more grain than unselected varieties.

"The records of the performance of all these padi exhibited are shown on the labels attached to the exhibits, which performance has been officially checked in the field and certified. It will be noted that, in most cases, the yields obtained have been high. These high yields have stimulated extensive distribution of seed by growers themselves.

"The total number of exhibits is rather smaller than was at one time anticipated owing to the extensive flood damage which occurred during the season in certain areas; still, the large collection now displayed is a

good indication of the widespread attention local padi planters are giving to the matter of growing selected varieties of padi".

Each exhibit consisted of one gantang of padi contained in a bamboo basket of suitable shape and size. This arrangement proved most suitable and convenient for displaying the samples, the total number of which was 654. In addition, there was a large Departmental Stand, on which were shewn padi and ears of thirty-two selected pure lines grown at Telok Chengai. Charts shewing the average monthly rainfall over a period of 20 years, as well as the crops of padi of the last 11 years compared with the acreage planted, were exhibited. A series of photographs of manurial and other experiments on Kedah experimental stations was included.

The exhibits were judged by the State Agricultural Officer, Perak, (Mr. F. Birkenshaw), Che Ismail, and Towkay Kung Cheng Oon, Assistant Manager of the Ban Heng Bee Rice Mill, on the day before the Show opened; and on the morning of the second day of the Show, H.H. The Regent presented the silver cups to the winners.

Of the padi shewn, the highest number of exhibits was of Siam 29 with 185 exhibits, followed by Nachin 10 with 91, and the local Radin China with 68, whilst Siam 76 and Radin China 12 had 46 each, and Mayang Ebus 85 had 45.

The silver cup presented by H.H. the Sultan for the best exhibit of padi was won by Aisha binti Mohd. Noh, Circle A, Mukim Telok Chengai, with variety Siam 29; the second prize, a silver cup, presented by the late Raja Muda, going to Haji Saaid bin Haji Ahmad, Circle B, Mukim Pumpong with variety Mayang Ebus 88; the third silver cup, presented by the Hon'ble Mr. J. D. Hall, British Adviser, was won by Mat Isa bin Saad, Circle C, Mukim Anak Bukit with variety Siam 76.

Two silver cups were presented by Messrs Cheng Lye Hock and Cheng Lye Hin of the Ban Heng Bee Rice Mill and Mr. Chong Ah Leng of the Simpang Empat Rice Mill for the best exhibits of local selection of varieties Reyong and Mayang Ebus. The cups were won by Mohamed bin Yasin, Circle D, Mukim Tajar for Reyong 6, and by Ja'afar bin Shariff, Circle A, Mukim Pengkalan Kundor for Mayang Ebus 88, respectively.

In addition, a silver medal and diploma were awarded for the winning exhibit in each Circle. Cash prizes were also given for the three best exhibits of each of the thirteen selected varieties of padi in each section. The total amount of these awards was \$464.

A very large number of visitors attended the Show and keen interest was displayed.

The Rural Lecture Caravan visited the Show and displayed its collection of agricultural exhibits and in the evening screened educational films concerning agriculture and co-operation in Malaya.

The opinion is confidently expressed that the aims and objects of the show have been fully realised and that there will be a large extension of planting of improved strains of padi next season to the benefit of the planters and the State.

AGRICULTURAL SHOW. ALOR GAJAH MALACCA.

The first Agricultural Show to be held in the District of Alor Gajah took place on 23rd March 1935. In 1934 a show was held which was confined to exhibits of padi.

The agricultural classes were well supported, except in the poultry section, in which entries were few and the quality generally poor. In all other classes competition was keen and some very good quality exhibits were to be seen. Entries in the padi competition were numerous and shewed a great improvement over last year in general purity and quality.

An exhibit of padi, poultry and manila hemp was put up by the Department of Agriculture and attracted considerable interest throughout the day.

A new type of smoke cabinet for small-holders' rubber, erected by the Rubber Research Institute of Malaya, was also a centre of interest, so much so that the rubber sheet being smoked could not be dried by the end of the day owing to the door being constantly opened by visitors.

RELIEF TO THE COCONUT AND OIL PALM INDUSTRIES, 1935.

In order to afford a measure of relief to the coconut and oil palm industries, the Federated Malay States Government made certain concessions in 1934. It has been decided to grant the same concessions in 1935 as were granted in 1934. The concessions are as follows:—

Coconut Industry.

In the case of lands exceeding 10 acres in area:

- (a) the rent on planted areas already enjoying the rebate for land cultivated with coconuts under the Land Rules and paying \$2 an acre will be reduced to \$1 per acre;
- (b) unplanted areas will also pay \$1 per acre only.

In the case of lands not exceeding 10 acres in area, the effect of the concession will be to reduce the rent, which is in the majority of cases less than \$2 per acre, by half.

Oil Palm Industry.

A rebate will be given of 50 per cent. of the rent payable with a minimum of \$1 per acre on planted and unplanted areas.

Applications for this concession should be made to the Collector of Land Revenue of the district in which the land is situated. The question of the eligibility of applicants for the concession is a matter for the discretion of the State authorities.

In cases where rent has already been paid for the current year, any excess of payment as a result of the grant of the waiver will be carried forward as a credit to 1936.

In the event of rent not being paid by the 31st December, 1935, the arrears will be carried forward at the full rate.



IMPERIAL FRUIT SHOW.

The Imperial Fruit Show was held at Leicester from 2nd to 10th November, 1934. The Malaya stand, organised by the Malayan Information Agency occupied a site next to the main entrance and attracted much attention. Exhibits were devoted to the various brands and grades of canned pineapples produced in Malaya. Cookery demonstrations were given at frequent intervals shewing the different ways of using canned pineapple.

INTERNATIONAL GROCERS' EXHIBITION.

The exhibition was held in September 1934 at the Royal Agricultural Hall, Islington. The main display on the stand organised by the Malayan Information Agency was canned pineapples, but tapioca, pepper, nutmegs, coconut-flour, coconut oil, palm oil and tea were also included.

This exhibition is very important inasmuch as it is attended by all the leading men in the canned goods trade from every part of the United Kingdom. The Malayan display serves a good purpose in keeping Malayan canned pineapple before the eyes of the trade.

Selected Article.

TEA PRODUCTION, CONSUMPTION, AND PROSPECTS.*

The Position under the Restriction Scheme.

The present is the centenary year of the tea industry of the British Empire, and this occurs at a time when the tea-growers are again resorting to artificial means of restricting outputs in order to improve an adverse statistical situation. Exports of tea from the principal countries of production in the East have been controlled since April 1, 1933, following an agreement between the British and the Dutch growers on a scheme for restricting outputs at the source, with the object of bringing supply more in accordance with demand and with a view to reducing the excessive stocks in existence. After over one and a half years of restriction by the regulation of exports, however, the position still remains unsatisfactory to the producer.

The standard maximum production to be allowed in any one year to each of the principal countries of production was fixed for the present period of the regulation scheme—that is, to the year 1938—as follows:—

					lb.
India	...	...	...	...	382,594,779
Ceylon	...	...	...	...	251,522,617
Dutch East Indies	...	...	...	...	173,597,000
Total					807,714,396

These figures are based on the highest export returns from each country for the years 1929-31, and no allowance was made for immature areas or extensions to the existing acreage, which are taken into account when allotting the internal percentage of production of each estate or group of estates. In order to keep production within the quota it has therefore been necessary for growers drastically to curtail outputs, and the estate restricted percentage has been from 25 to 35 per cent. of the potential maximum.

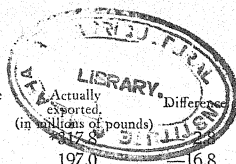
A Prohibition Clause.

A vital clause in the restriction agreement is the prohibition of fresh plantings or extensions to present areas, which is important, for in previous years production was increasing from an annual expansion in the acreage coming into bearing.

For the first year of control, 1933-4, the exportable maximum was fixed at 85 per cent. of the basic standard, allowing for the export of 682,000,000 lb. and being equal to a reduction in shipments of approximately 125,000,000 lb.

Total exports from all three sources, however, only amounted to 651,000,000 lb., being accounted for as follows:—

*By "Our Mincing Lane Correspondent" in *The Manchester Guardian Commercial*, 30th November, 1934.



	Exportable quantity	Actually exported (in millions of pounds)	Difference
India (by sea) ...	320.6	317.8	2.8
Ceylon ...	213.8	197.0	16.8
Dutch East Indies ...	147.6	136.1	11.5
Total ...	682.0	650.9	31.1

* Provisional

The reason for the difference between actual exports and the permissible quantity was mainly due to export rights not being fully used, and as these can be carried over to the next year they must be allowed for in taking into account available supplies to come forward. Production in countries outside the restriction agreement showed an expansion last year, but not on a scale to be regarded as serious at present, amounting to 142,600,000 lb., as compared with 134,000,000 lb. for 1932-3.

Consumption for the year to March 31, 1934, according to deliveries from bond in the United Kingdom and from imports into other countries, showed an increase on the previous year about equal to the expansion shown in production in unrestricted countries—that is, 8,000,000 lb.,—and exceeded gross exports for the year by about 67,000,000 lb. Incidentally, it may be remarked, the largest individual increase was about 20,000,000 lb. taken by Russia. This net increase of 59,000,000 lb. represents the reduction in visible world stocks, but does not include, of course, any possible reduction in invisible stocks held by blenders, distributors, &c.

While last year showed an increase on the previous year, however, consumption during the past two years in virtually all tea-drinking countries has shown a decrease on the preceding period, but, owing to the method adopted for arriving at the relative figures, real consumption is difficult to determine. In the United Kingdom this is arrived at from the deliveries from bond, but for several years withdrawals were excessive in anticipation of tea duty being reimposed after being removed in April, 1929. The reduced purchasing power of consumers during recent years from economic causes and exchange restrictions, together with lack of credit facilities, has played a considerable part in the declining consuming demand.

Unexpected Market Trend.

When the International Tea Committee met to fix the quota for the second year, a release of approximately 20,000,000 lb., being $2\frac{1}{2}$ per cent., and making the quota $87\frac{1}{2}$ per cent. of the exportable maximum, was allowed, but the market has since gone contrary to expectations, and on the eve of the announcement

of the quota for the third year of control, commencing April 1 next, the statistical position in terms of visible supplies, and also the trend of prices at the auctions, both compare adversely with the same period of last year.

To the release of 20,000,000 lb. referred to above must be added the difference between the exportable quantity and that actually exported last year—that is, 31,100,000 lb. This gives a total exportable quantity for the current restriction year of 733,100,000 lb. For the first seven months of this period, April 1 to October 31, the actual exports exceeded those of the corresponding period of last year by 29,135,673 lb., the comparative figures being as follows :

From	1933	1934	Difference.
N. India ...	171,205,346	181,314,282	+10,108,936
Ceylon ...	122,335,159	140,450,701	+18,115,542
Java ...	62,751,946	63,663,141	+ 911,195
Total ...	356,292,451	385,428,124	+29,135,673

Furthermore, notwithstanding the fact that stocks were drawn upon during the year ending March, 1934, as indicated above, stocks in the bonded warehouses on October 31 last, according to the Board of Trade returns, were higher, amounting to 279,581,000 lb., as compared with 263,642,113 lb. a year ago, and 264,000,000 lb. in 1932.

It will now be seen why prices are depressed at the sales. Stocks in London at the bonded warehouses at the end of each month are generally accepted as the barometer of the trade, and movements each month are closely watched for an indication of the trend of consuming demand, which can be estimated in relation to import returns and in conjunction with deliveries for home consumption, taken together with the re-export figures. The main reason that restriction would appear to have so far failed to improve the statistical position as reflected in the adverse stock returns, and so bring about the rise in price to the level desired, is due to the fact that heavy stocks constituting invisible supplies have evidently been held by blenders and distributors considerably in excess of earlier estimates, and this is confirmed to a large extent by the returns of deliveries for the last three years during the period from January 1 to October 31, which are as follows :—

1934	...	...	(lb.)	360,371,912
1933	...	...	„	382,116,227
1932	...	...	„	400,074,735

There is no apparent reason for doubting that real consumption in the United Kingdom has been well maintained, the only difference, though an important one to a section of growers, being a change of popular taste in favour of cheaper teas and blends, which is reflected in the quality price trend at the

sales. It is normal for stocks to increase at the latter part and the beginning of each year owing to heavy shipments from Northern India, where crops are seasonal and the season ends about November, opening again in June.

Tea crops in all the other principal producing countries continue throughout the year, seasonal changes being shown in quality and outputs in accordance with climatic conditions in the various districts. The North India crop for the season to the end of October is 294,869,360 lb., as compared with 287,267,760 lb. to the end of October last year and 320,584,960 lb. for the same period of 1932.

Normally the size of the Northern India crop was quickly reflected in the statistical position and was an important factor influencing the course of prices at the sales, but with restriction this factor no longer operates, as with export licences negotiable and transferable crop returns are more or less stabilised in ultimate exports.

The Traffic in Licences.

A questionable feature of the restriction ordinances and a factor leading to the narrow price margin ruling between teas of different elevation and growth is the traffic allowed in export licences, which, being negotiable, have passed from the ownership of low-grown tea growers and native holders to the hands of fine-quality tea producers, with the result that shipments of cheaper grades have been relatively less than medium and fine invoices. From the point of view of growers the result to date of the export regulation scheme has been to benefit producers of lower grades, and in consequence the low-grown and poorer quality teas show the largest advance in price when compared with medium growths, while fine-quality teas are selling below the level ruling before restriction came into force.

Stocks at the end of the year look like being equal to over nine months' supply, or about 50 per cent. in excess of what is considered ample for normal requirements, so an improving situation can only be brought about in the immediate future by a further reduction in exports from producing countries, assisted by an expansion in consumption. Efforts are being made to increase consumption and to revive demand for better quality teas by means of an extensive propaganda campaign organised through the co-operation of the tea-growers' associations. An export credit scheme for facilitating shipments to Russia by means of a finance company is also receiving the consideration of members of the various tea-growers' associations, the object being to finance shipments in excess of the present restricted demand by Russia to the extent of 40,000,000 lb. per annum, being equal to 5 per cent. of the standard maximum crop outturn during the term of the restriction agreement.

At the sales factors influencing the trend of prices will be the quota of production allowed for 1935 and also the progress made by propaganda, and there is reason to expect an expansion in consuming demand with a return of more normal times at home and in other markets. A strong feeling is growing

that the abolition of the preferential duty on Empire tea would be to the benefit of the British grower, as since this was imposed competition has resulted for outside markets previously held by Ceylon and Indian teas, and accounts to some extent for the increase in shipments to the United Kingdom from these two sources.

This Year's Price Decline.

Prices at tea sales in Mincing Lane were quickly stimulated by the advent of the restriction scheme, and, whereas in January, 1933, the average price for all teas was under 7½d. per pound, in December last year it was nearly 1s. 2½d. During 1934 the market has reversed the trend of the previous year, and from over 1s. 3d. in January the weekly sale average has declined by nearly 3d.

The average sale prices for teas of all grades and growths from the various sources of production for the week ending November 22 and the comparative averages to date for the year are—

		Week ending Nov. 22 1934.	Corresponding week, Nov. 23 1933.	Total to date	
				Jan. 1 1934.	Jan. 1 1933.
		s. d.	s. d.	s. d.	s. d.
N. India	...	11.96	1 0.83	1 1.55	11.12
S. India	...	11.45	1 1.28	1 1.03	10.45
Ceylon	...	1 1.73	1 3.28	1 2	1 1.40
Java	...	10.30	11.05	11.24	7.88
Sumatra	...	9.21	10.08	10.31	6.95
Nyasaland	...	10.83	10.87	1 0.52	8.54
Average	...	1 0.09	1 2.26	1 1.37	11.56

In connection with the above comparative averages for the year to date it should be mentioned that prices at the sales last year only began to reflect to any extent the influence of restriction during the second half of the year, as prior to that period a low level was ruling. In regard to prospects, a sharp recovery in the weekly average will be necessary from now on to correspond favourably with the upward tendency which began about this time last year and continued each week to the end of January, when the decline to the present level set in.

The adverse situation for the grower is more clearly illustrated in the comparative averages for the Northern Indian teas, which for the present season to date is 1s. 0.78d., as against 1s. 2.89d. for the corresponding period last season.

The International Tea Committee has met to decide on the quota for the third year of control, commencing April 1 next, and, in view of the situation revealed above, its decision, due at the end of the month, is awaited with interest.

Reviews.

The Oil Palm in Malaya.

*B. Bunting, C. D. V. Georgi and J. N. Milsum. Malayan Planting Manual No. 1
Published by the Department of Agriculture, Straits Settlements and
Federated Malay States, 1934, pp. 293 including Index,
36 illustrations, two graphs and four plans.
Price \$2 post free.*

This Manual on one of the important major agricultural industries in Malaya will be welcomed not only by all planters concerned with the cultivation of oil palms but also by those who have a financial interest in oil palm estates and by agricultural and other technical officers who are required to give advice in relation to the various aspects of cultivation of the oil palm and preparation of the products for the market. No authoritative publication on this crop has appeared subsequent to the bulletin published by the Department of Agriculture in 1927, since which date not only have considerable advances in our knowledge been made, but also a large extension of the area under cultivation in Sumatra (Netherlands Indies) and Malaya.

The Manual is divided conveniently into twenty-two chapters each dealing with a particular aspect of the cultivation of the palm, diseases and pests, harvesting of the crop and preparation of the two principal products—palm oil and palm kernels.

In addition, chapters on packing, shipping and marketing, uses of oil palm products, production costs and returns contain much information of value to present and prospective planters of this crop.

A useful appendix includes "Conditions for alienation of Land in the Federated Malay States and the State of Johore", in which States practically the whole of the present areas under this crop have been planted in Malaya.

The inclusion of an index also adds to the usefulness of the Manual.

The information given, as far as our present knowledge is concerned, is sufficiently detailed to enable any intelligent planter to carry out all the essential operations on an estate, from the selection and planting of seed, to the erection of a factory and the preparation and shipment of the final products.

The chapters on Manuring and Seed Selection indicate that further experimental work is required in relation to these important problems. In other respects however, very considerable knowledge has been acquired since the introduction of the oil palm as a plantation crop in Malaya and authoritative recommendations can be made in relation to many estate practices.

About half the Manual is devoted to estate factory procedure and the preparation of oil palm products, but this does not indicate any lack of balance

in treatment, since this aspect of oil palm estate practice is of considerable importance when the fruit which is harvested has to undergo subsequent treatment on the estate for the preparation of two marketable products.

A valuable section in this part of the Manual is a comparison of the two principal methods of expression of palm oil employed on plantations in the East *viz.* the centrifugal and press systems.

It is of interest to record that the authors still consider that the centrifugal process of extraction, first recommended by the Department of Agriculture, possesses certain advantages over the press system.

The illustrations are excellent and supplement very clearly the narrative. The graphs and diagrams of factory lay-out are also very useful.

The Manual should prove of considerable value not only to planters, estate agencies and directors of oil palm estates in Malaya but also to those interested in the cultivation of this product in other countries.

The writer of this review, although no longer connected with the oil palm industry in Malaya, has had the good fortune to be able to keep in touch with recent progress in Malaya and with the scientific work which is being carried out in Malaya and elsewhere and is therefore able to appreciate the very valuable work which has been carried out by the officers of the Department of Agriculture who are the authors of this publication and by other officers mentioned by the Director of the Department in his preface to the Manual.

The Manual may be considered to be an up-to-date compendium of our present knowledge of an important tropical agricultural crop which has become a cultivated or plantation crop practically within the last two decades, which is only a brief period in the life history of the palm.

B. J. E.

The Toxic Value of *Derris* Spp.

N. C. E. Miller. Special Bulletin, Scientific Series No. 16. Department of Agriculture, Straits Settlements and Federated Malay States.
44 pp. 1 plate. Price 50 cents (Straits Currency).

The nature of the toxic value of derris (tuba root) and its degree of toxicity are subjects which are still shrouded in uncertainty. The present knowledge of the subject has resulted in a different standard of valuation being adopted in the United States of America to that accepted in the United Kingdom. In the former country, valuation is based on the rotenone content, whereas in the latter country total toxic content is made the standard for valuation. The author has sought to elucidate this subject by means of carefully controlled tests on certain insects, rats and fish.

He points out that although accounts of many experiments may be found in the literature of economic entomology, in many cases the results are unreliable because they are based on one or two tests in the field, where it is difficult to estimate accurately the actual mortality due to the action of the insecticide, and quite impossible to compute how many insects were temporarily driven away, probably to return later. His own experiments, conducted under controlled conditions in the laboratory are not, therefore, open to the same criticism.

The experiments were carried out with two species of derris, *vis*: *Derris elliptica* Prain (from two sources) and *Derris Malaccensis* Prain var. *sarawakensis* Hend., using aqueous and alcoholic solution and dusts of each, and also the three constituents, rotenone, deguelin and toxicarol. The subjects of the experiments included a number of insects, of which the larvae of the Noctuid moth *Spodoptora pecten* Guen. a grass feeder, and Cassidinid beetle *Aspidomorpha miliaris* F. proved the most suitable from the point of view of their adaptability to laboratory conditions and their abundance. Experiments were also conducted on certain fish and on the common house rat (*Rattus rattus diardi* Jent.).

The conclusions of the author, adequately supported by the data produced, are of particular interest. He shews that with these insects, derris in any form has little value as a stomach poison, and the indications are that derris acts as a repellent to insects, the nervous system of which it also affects through the integument. He shews further that derris is toxic to insects without actual contact, indicating that it yields a volatile poisonous substance.

Rotenone, deguelin and toxicarol dissolved in acetone, are toxic to fish, but only moderately so to the insects used in the tests; while rotenone was ineffective as a stomach poison to the cockroach *Periplaneta americana* L. and to the rat, *Rattus rattus diardi* Jent. Aqueous solutions, ether extract, and dust of derris, incorporated in baits for *Periplaneta americana* L. had a repellent action.

In respect of the three kinds of derris used, as regards toxicity to the subjects used in the investigations, there is little to choose between them, and the rotenone content is not necessarily a reliable index to the toxic value.

Observations on the methods of preparing derris extract for use are made. There appeared to be no advantage in the use of hot water in the preparation of an aqueous solution and the loss of toxicity of such solution on standing is far less rapid than is generally thought to be the case. The preparation of a dust from derris, by the addition of barium hydroxide, or of milk of lime, which causes the solids to be precipitated, was used with success. The precipitate when dried and sieved is ready for use. The employment of milk of lime for this purpose was set forth in the first instance by Bagnell-Bull, who holds a British patent for this process.

D. H. G.

Departmental. FROM THE DISTRICTS.

*Compiled by the Chief Field Officer from Monthly Reports submitted
by Field Officers.*

March, 1935.

The Weather.

The weather during March was fairly normal throughout the Peninsula, being hot and dry during the first two or three weeks and showery in the latter part of the month. The rainfall was in general about, or slightly below, the average, but was notably deficient in Kelantan, along most parts of the western coast and in the central area included in southern Perak, northern Selangor and the Temerloh District of Pahang.

Remarks on Crops.

Rubber. Prices showed a considerable decline until a revision of the exportable percentage of the quotas was announced when they recovered steadily towards the end of the month.

Increases in the number of holdings not tapped were reported from several parts of Malaya. The main causes were padi harvest, wintering of the trees, exhaustion of export coupons or sale of coupons.

Mainly owing to the dry weather conditions, mouldy rot disease was not much in evidence, but reports of leaf mildew, *Oidium Heveae*, on large estates were received from all parts of the country, while its presence on small holdings in most areas was also recorded. On the whole, the attacks were mild and caused no serious damage.

A Malay in Kuala Kangsar District was found to be using a cabinet made of bamboo and sacking for smoking rubber sheet. From plans sent by the Asiatic Rubber Instructor to the Rubber Research Institute a similar cabinet was constructed with modifications to improve ventilation and decrease the risk of fire. This cabinet has been shown to make smoked sheet of good quality and can be constructed for a maximum cost of \$6 for materials, some of which the owner of a small holding can often obtain for himself.

Padi. At the end of the month the padi harvest was nearing completion in all the more important padi areas such as Kedah, Province Wellesley, Krian, Negri Sembilan, Malacca and Kelantan. Elsewhere it had commenced and was progressing steadily except in the large new Panchang Bedina area in Selangor where the season has been arranged for a harvest in May. Crop prospects remain as stated for February. The Krian crop appears to be about the same in volume as that of the previous season, but the grain is light, probably owing to the effects of the drought in December. For the second year in succession there was a shortage of labour during the harvest in Krian, but this apparently did not give rise to any serious losses of crop.

Preparation of land and planting of nurseries for the coming season have been commenced in the inland Districts of Selangor, Jelebu and part of Kuala

Pilah District in Negri Sembilan, the river mukims in Kuala Lipis and Pekan Districts of Pahang and the northern portion of Johore.

Competition for the purchase of the Krian crop has remained keen and the growers have benefitted from the resulting improvement in price. Slightly better prices are reported from all parts of the country. Supplies of padi for the new Temerloh rice mill are only coming forward slowly as growers are apparently holding back in the hope of a further increase in price.

The first stages of the All-Malayan Padi Competition have commenced with the holding of local competitions. These include the State Competition in Kedah, District competitions for Alor Gajah in Malacca, Rembau and Tampin in Negri Sembilan and Pekan in Pahang as well as local competitions at Pontian and Segamat in Johore. The number of entries at these competitions has been quite satisfactory and the quality of the exhibits has shown a marked improvement in centres where a competition was held last year.

These competitions are doing much to advertise the merits of high-yielding pure strains of padi. In Kedah, only these strains were accepted for the competition, of which one of the main objects was to encourage the planting over wide areas of a few of the high-yielding strains best suited to the special conditions of each locality and so to provide large quantities of uniform grain for milling. In Krian, a stage has been reached where it is possible to recommend the cultivation for the main crop of one particular strain throughout the whole of the north-western area, while there is a choice of two good strains for the somewhat harder and shallower lands of the south-eastern portion of the District.

Large scale tests were carried out at the Bagan Serai mill with five of the best yielding strains, all of which gave a rice of good quality containing a satisfactorily low percentage of broken grain. These tests showed clearly the effect of uniformity of padi grain on the quality of the resultant rice.

Arrangements are being made in Krian to encourage the wide planting of the best strain for each set of conditions and to provide a large supply of seed in the coming season.

Millers both in Kedah and in Krian are supporting the cultivation of a single pure strain over a wide area and have expressed willingness to pay a bonus for large supplies of uniform grain that complies with certain conditions.

In Raub and Lipis Districts of Pahang the merits of as many as eight different pure strains have received recognition in different localities. In these Districts the yield under local conditions, and good cooking qualities, are the two characteristics of primary importance, since padi is mainly grown for home consumption. In the absence of milling facilities uniformity of grain is a minor consideration.

Coconuts and Copra. Prices for copra fluctuated considerably during the month and were, on the average, below those for February. The price has, however, remained high enough to maintain interest in copra production. Two or three new kilns have been erected by Malays in the Kuala Langat District

of Selangor. The kiln of approved type at Kuala Pahang produced copra of satisfactory quality for which regular sales at a premium of 10 cents above the current market price have been arranged. Two approved kilns have been erected in Tioman Island, off the Pahang coast; only one of these has so far been operated, owing mainly to transport difficulties during the monsoon season.

The seasonal shortage of nuts has continued in several parts of the country. This has led, except in a few areas, to prices for fresh nuts which are high in relation to the existing price of copra and has maintained the price for home-made coconut oil. The export of coconuts from Singapore to Hongkong is reported to have increased considerably.

In the Seremban and Rembau Districts of Negri Sembilan as also in the Kuala Tembeling area in Pahang, where supplies of nuts are insufficient to meet local requirements, some progress is being made in the replacement of old palms by young plants and in the planting of additional new areas.

Pineapples. The crop of fruit was ripening in Selangor during the month and was being sold either to the Klang pineapple factory or to Singapore where a shortage of supply resulted in prices higher than those obtainable in Selangor. In Johore fruit supplies were adequate to keep the factories in active operation.

Fruit. Light crops of durian, langsat and rambutan were obtained in Kuala Pilah District, but in most parts of the country these trees and the pulasan are flowering or just setting fruit. Good crops are anticipated in parts of Perak and in Malacca. Fruits in season were the chiku and also the mango in parts of Pahang and Johore. There continued to be large exports of bananas from Jelebu to various markets, while the same fruit was conveyed by lorries from Batu Pahat District to Singapore.

Tobacco. Prices for tobacco have remained at about the same high level as in February, the general range being \$20 to \$50 according to quality. In Central and Southern Perak, however, the range has been \$30 to \$80 owing to the shortage of supplies caused by unfavourable weather conditions earlier in the season and by the attacks of stem borers. These prices have maintained interest in the cultivation of the crop. In Kedah a further area of 37 acres is reported to have been planted and extensions of the planted area are recorded in Province Wellesley and in Upper Perak.

Agricultural Stations and Padi Test Plots.

At the Kuala Kangsar Agricultural Station a groundnut manurial experiment was harvested and the results were analysed. A significant increase in yield was obtained from the plots on which a green dressing, grass or legume was buried in fresh one week before planting.

A site of 7 acres for a new Station at Telok Datoh in Kuala Langat District was marked out. A contract was let for clearing *lallang* grass with which the land was covered, and the first digging was completed.

On the site of the new Raub Station, timber clearing was completed and good progress was made in construction of the system of drains.

Harvesting was completed on the Bukit Gantang Padi Test Plot in Perak. Average yields for the respective varieties in gantangs per acre were :—Seraup 450, Radin and Siam 330, Radin Siak 200.

Harvest was finished on the Pulau Gadong Station in Malacca. In some of the new fields to be used for mechanical cultivation experiments, work on removal of buried timber and on levelling was in progress.

On the new Jelebu Test Plot in Negri Sembilan land was prepared for planting and nurseries were sown.

Rural Lecture Caravan.

This Caravan visited eight centres in the Batang Padang District of Perak during the period February 24th to March 11th, stopping two days at each centre. The subjects of lectures and demonstrations were the preparation of good quality sheet rubber and the housing and feeding of poultry. Attendances were good at each centre and the total number of persons present was estimated to be 11,000.

The Caravan attended the Agricultural Show at Alor Star, Kedah, on March 13th and 14th and commenced a tour in Larut District on March 25th. Attendances up to the end of the month were reported to have been very satisfactory.

In connexion with this tour, an innovation is being tried in the form of a day tour with the exhibits only to out-lying places to which it is not possible to take the Caravan. The exhibits will be taken to the chosen centres on bicycles. This tour will be undertaken in the second half of April during the period when bright moonlight interferes with displays of films and lantern slides in the open.

Extension Lectures.

Four lectures were given at different centres in Krian South by the Malay Agricultural Assistant in charge of this area, three on "Poultry Husbandry" and one on "Padi—the Millers' Requirements". It is hoped to initiate a series of lectures throughout the District dealing with such subjects as rubber tapping and manufacture of sheet, copra manufacture, plant propagation and poultry husbandry.

Show for Tourist Ship.

An exhibit of local agricultural produce was put up in Malacca for the visit of the s.s. "Resolute" on March 9th. It was much appreciated by the visitors and numerous questions were asked.

Poultry.

As a result of lectures and demonstrations given during tours of the Rural Lecture Caravan and at other times, some improvement in the housing of poultry in the villages is recorded from Central and Southern Perak and from Selangor. In the latter State, however, it is added that there is still much room for improvement in cleanliness and general sanitation.

A serious outbreak of disease believed to be a form of diarrhoea at Sabak in Kuala Selangor District destroyed half the local fowl population. Another outbreak at Tras in the Raub District of Pahang resulted in 113 deaths. The Government Veterinary Surgeon made investigations into the cause of this outbreak.

DEPARTMENTAL NOTES.



Obituary.

Inche Mohamed Bazir bin Abdul Rahman.

We regret to record the death, at the age of 50, of Inche Mohamed Bazir bin Abdul Rahman, Malay Agricultural Subordinate, Grade II, which took place on 15th March 1935. This officer served in this Department for twenty-five years during which period he proved himself to be a tactful and efficient officer.

Visits of the Adviser on Agriculture.

The Adviser on Agriculture made an official visit to Penang, Province Wellesley and Kedah between 11th and 15th March. In Penang and Province Wellesley he inspected the various agricultural undertakings of the Department of Agriculture, discussed departmental matters with the Agricultural Officer and conferred with the Resident Councillor, Penang. He left Province Wellesley for Kedah on the 12th and attended the opening of the State Padi Show at Alor Star on the 13th.

On 26th March the Adviser proceeded to Singapore where His Excellency the Governor granted him an interview. He interviewed the Hon'ble the Colonial Secretary, various officials and unofficials, inspected the Singapore Pineapple Station, and discussed numerous questions with the Agricultural Officer, Singapore.

On the 28th he went to Johore Bahru, returning to Singapore on the same day. In Johore he had an interview with the Hon'ble the General Adviser, Johore, met various other officials, and discussed numerous points with the State Agricultural Officer, Johore. He returned to Kuala Lumpur on the night of March 29th.

Agricultural Shows in March.

Officers of the Department have been closely concerned in the organisation of two agricultural shows held during the month, one at Alor Gajah, Malacca, and the other at Alor Star, Kedah. While in no way wishing to belittle the successful show in Malacca, attention is particularly directed to the Padi Show held at Alor Star for this was an event carried out on novel and progressive lines and may serve as a model for similar padi shows elsewhere. At Alor Star the padi exhibits were confined to samples drawn from crops obtained by the use of seed originally selected by the Department of Agriculture. The success of this show should lead to extended use of improved seed in Kedah. Shows of a similar nature will doubtless be organised in other parts of the country when and as selected seed becomes more widely known and more extensively planted.

Statistical.

MARKET PRICES.

March, 1935.

Rubber.—The rubber market suffered a severe set-back in March, the price for spot loose in Singapore falling to 17½ cents per lb. towards the end of the month. The market opened at 20½ cents and closed at 18½ cents per lb., the average for No. 1. X. Rubber Smoked Sheet being 19.49 cents per lb. as compared with 21.10 cents per lb. in February. The average price in London for the month was 5.76 pence per lb. and in New York 11.42 cents gold per lb. as compared with 6.30 pence and 12.79 cents gold in February.

The following table shows weekly prices paid at three centres during the month for small-holders' rubber.

Table I.
Weekly Prices Paid By Local Dealers for
Small-Holders' Rubber, March, 1935.

(Dollars per Picul.)

Grades.	Kuala Pilah, Negri Sembilan.				Kuala Kangsar, Perak.			Batu Pahat, Johore.			
	7	14	21	28	6	13	20	6	13	20	27
Smoked sheet	23.88	23.30	21.00	23.91	23.65	22.87	21.00			19.20	
Unsmoked sheet	22.00	21.87	20.00		20.00	19.52	17.66	20.35	20.00		
Scrap	16.50							17.74			17.91

Transport by lorry Kuala Pilah to Seremban 15 cents per picul, to Malacca excluding duty, 25 cents per picul, by rail Seremban to Penang \$1.24 per picul, Seremban to Singapore \$8.00 per ton.

Transport from Batu Pahat to Singapore by lorry excluding duty, 90 cents per picul.

Transport from Kuala Kangsar to Prai by railway \$6.20 per ton.

Transport from Kuala Kangsar to Singapore by railway \$10.00 per ton (minimum consignment 5 tons).

At Kuala Pilah the standard deduction for moisture in unsmoked sheet is 5 per cent.

At Kuala Kangsar the standard deduction for moisture in unsmoked sheet is 10 per cent. No purchases at Kuala Kangsar on 27th March, 1935.

Palm Oil.—Prices for Malayan palm oil and kernels rose still further during the first half of March, but fell away rapidly at the close as shewn by the following table of quotations.

Table II.
Prices of Palm Oil and Palm Kernels.

Date 1935.	Palm Oil in Bulk, c.i.f. landed weight Liverpool/ Halifax.	Palm Kernels, c.i.f. landed weight London/ Continent
March 1	per ton £ 23. 17. 6	per ton £ 9. 5. 0
„ 8	24. 10. 0	9. 5. 0
„ 15	22. 0. 0	8. 0. 0
„ 22	21. 0. 0	8. 0. 0
„ 29	21. 0 0	8. 5. 0

Copra.—Prices in Singapore fell considerably during March but rallied somewhat at the close. Opening at a peak of \$4.90 per picul, the sun-dried grade fell to \$3.95 in the middle of the month and closed at \$4.40, an average of \$4.44 per picul. The mixed quality followed the same course and averaged \$4.19 per picul. The February averages were \$4.60 and \$4.40 per picul respectively.

The price of copra cake fell considerably during the month, averaging \$1.43 per picul as compared with \$1.95 in February.

Rice.—The average wholesale prices of rice per picul in Singapore during February were as follows:—Siam No. 2 (ordinary) \$3.37, Rangoon No. 1 \$3.16, Saigon No. 1 \$3.32, as compared with \$3.11, \$2.89 and \$3.02 in January. Corresponding prices in February 1934 were:—\$3.06, \$2.50 and \$2.60.

The average retail market prices in cents per gantang of No. 2 Siam rice in February were:—Singapore 23, Penang 20, Malacca 22, as compared with 22, 20 and 22 respectively in January.

Padi.—The Government Rice Mill, Bagan Serai, continued to pay \$2 per picul for padi during March but towards the close dropped to \$1.80. The privately owned mill similarly reduced its price to \$1.55 per picul. Prices per gantang varied from $4\frac{1}{2}$ to 11 cents in different parts of the country.

Tea.—Malayan tea was again represented on the London market in February. Two consignments of Kedah tea were sold at average prices of $10\frac{3}{4}$ d. and $10\frac{1}{4}$ d. per lb. Boh Plantations tea was sold at an average of 11d.

per lb. Average London prices per lb. paid during February for tea consignments from other countries were as follows:—Ceylon 1s. 2.16d., Java 9.49d., Indian Northern 11.94d., Indian Southern 11.65d., Sumatra 8.60d.

The latest available London average prices (7th March, 1935) are 1s. 3.25d., 9.62d., 11.59d., 1s. 0.2d. and 8.72d. respectively. Boh Plantations teas were sold at 11d. per lb.

The following are the latest Colombo average prices available and are quoted from the *Weekly Tea Market Report*, 26th March 1935, of the Colombo Brokers' Association; prices are in rupee cents per lb.: High Grown Teas 91 cents, Medium Grown Teas 65 cents, Low Teas 56 cents.

Tuba Root (Derris).—The demand for good quality roots of Malayan origin was well maintained during March, and the price averaged \$38 per picul for roots sold on a basis of ether extract, as compared with \$34.50 in February. The price of non-Malayan roots sold on a similar basis of analysis was unchanged at \$30 per picul; stocks have, however, accumulated during the month. Roots of good rotenone content continued to average \$46 per picul.

Coffee.—Prices again fell during March. Sourabaya coffee opened at \$17 to \$18.50 per picul, improving slightly to \$17.50 to \$19 at the close. Palembang coffee averaged \$12.25 per picul as compared with \$12.94 in February.

Local prices for coffee were as low as \$15 to \$16 per picul in Johore and Kedah, but ranged to \$35 according to quality.

Arecanuts.—There was a further fall in prices during March. Average prices per picul in Singapore were:—Splits \$4.25 to \$5.86, Sliced \$7.20 to \$8.80, Red Whole \$5.65 to \$6.85, the price in each range depending upon quality.

The average prices per picul quoted by the Singapore Chamber of Commerce were: Best \$6.20, Medium \$5.59, Mixed \$4.31.

Gambier.—Prices in Singapore fell slightly during the month, Block averaging \$5.05 per picul and No. 1 Cube \$10.70 per picul as compared with \$5.12 and \$11.62 respectively in February.

Pineapples.—Prices weakened with poor demand for pineapples during the first half of March, but considerable business passed at the close, and the market strengthened. Average prices per case were:—Cubes \$3.19, Sliced Flat \$3.08, Sliced Tall \$3.23, as compared with \$3.45, \$3.17 and \$3.40 respectively in February.

Fresh fruit prices per 100 were:—Singapore, \$2.50 and \$1.75 for large and small sizes respectively; Johore, 1st quality \$1.70 to \$2.90; 2nd quality \$1.50 to \$2.30; 3rd quality 70 cents to \$1.80; Selangor, 70 cents to \$2 according to quality.

Tapioca.—Singapore prices remained unchanged throughout the month at the February closing levels with the exception of Seed Pearl which fell 5 cents per picul. Average prices per picul were:—Flake Fair \$4, Seed Pearl \$5.42, Medium Pearl \$6, as compared with \$3.75, \$5.47 and \$6 respectively in February.

Sago.—Prices eased slightly in Singapore during March and averages for the month were as follows :—Pearl, Small Fair, \$3.67 per picul, Flour, Sarawak Fair, \$2.42 per picul, as compared with \$3.77 and \$2.41 respectively in February.

Mace.—Prices in Singapore fell towards the close of the month, Siouw averaging \$105 per picul, and Amboina \$61.20 per picul. February average prices were \$95 and \$66.25 respectively.

Nutmegs.—Prices showed some slight improvement at the close of March after weakening in the middle of the month. Average prices were :—110's \$27.20 per picul and 80's \$28.20 per picul, as compared with \$27.50 and \$28.50 respectively in February.

Pepper.—There was a certain amount of enquiry for Black pepper in Singapore, but the market for White continued a nominal one with quotations falling heavily. Singapore Black averaged \$14, Singapore White \$32.40 and Muntok White \$33.40 per picul as compared with \$18.25, \$51.50 and \$53.50 respectively in February.

Cloves.—The Singapore market continued a nominal one but quotations for Amboina were marked down from \$45 to \$38 per picul, averaging \$40.80. Zanzibar remained unchanged at \$35 per picul.

Tobacco.—There was considerable variation in local prices of tobacco in different parts of the country. In Perak 1st quality was \$45 per picul, 2nd quality \$35 and 3rd quality \$15 to \$20 and in Perak Central the price rose as high as \$80 per picul. In other parts of the country the range was from \$14 to \$65, Java tobacco being quoted in Johore at \$50 to \$90 per picul.

The above prices are based on London and Singapore daily quotations for rubber; on the Singapore Chamber of Commerce Weekly Reports for the month and on other local sources of information. Palm oil reports are kindly supplied by Messrs. Guthrie & Co. Ltd., Kuala Lumpur; the Singapore prices for coffee and arecanuts by the Lianqui Trading Company of Singapore, and tuba prices by Messrs. Mackay & Co., Singapore.

1 picul = 133½ lbs. The Dollar is fixed at two shillings and four pence.

Note.—The Department of Agriculture will be pleased to assist planters in finding a market for agricultural produce. Similar assistance is also offered by the Malayan Information Agency, 57, Charing Cross, London, S.W.1.

GENERAL RICE SUMMARY.*

February 1935.

Malaya.—February imports of foreign rice into Malaya were 43,529 tons and exports 13,747 tons. Net imports for January and February totalled 71,493 tons, an increase of 6.9 per cent. when compared with the previous year†.

Of the imports during February, 49 per cent. were consigned to Singapore, 22 per cent. to Penang, 3 per cent. to Malacca, 23 per cent. to the Federated Malay States and 3 per cent. to the Unfederated Malay States. Of the total 63 per cent. came from Siam, 33 per cent. from Burma, 3 per cent. from French Indo-China and 1 per cent. from other countries.

Of the exports during February, 71 per cent. were consigned to the Netherlands Indies and 29 per cent. to other countries. The various kinds of rice exported were:—Siam 9,180 tons (66.8 per cent.) Burma 3,481 tons (25.3 per cent.), French Indo-China 491 tons (3.6 per cent.), parboiled 507 tons (3.7 per cent.), local production 88 tons (0.6 per cent.).

India and Burma.—Foreign exports in January were 94,000 tons, an increase of 22.0 per cent., as compared with 77,000 tons in 1934. Of these exports, 2.1 per cent. were to the United Kingdom, 1.1 per cent. to the Continent, 44.7 per cent. to Ceylon, 36.2 per cent. to the Straits Settlements and the Far East, and 15.9 per cent. to other countries. The 1934 percentages were 2.6, 5.2, 53.2, 20.8, and 18.2 respectively.

According to the *Indian Trade Journal* 28th February 1935, the total area under rice for the season 1934-35 is reported as 81,026,000 acres as compared with 83,102,000 acres in the previous season. The total yield is estimated at 29,830,000 tons as compared with 30,863,000 tons in 1933-34.

Burma's total exports of rice and bran (*Bangkok Times* 5th March 1935) for January 1935 were 315,135 metric tons as compared with 229,626 metric tons in 1934, an increase of 37.2 per cent.

Siam.—Exports of rice from Bangkok during January and February were 164,531 tons and 162,483 tons respectively, a total for the two months of 327,014 tons as compared with 260,175 tons in 1934. The 1935 figures are provisional.

Japan.—No further information is available since the January Summary.

French Indo-China. Entries of padi into Cholon during the period 1st January to 15th March, 1935, totalled 466,436 metric tons, an increase of 83.5 per cent. as compared with 1934. Exports of rice for the same period were 454,669 metric tons, an increase of 63.8 per cent.

The Netherlands Indies.—The area under padi in Java and Madura (*Economic Bulletin* 1st February 1935) for the period January to November 1934, amounted to 8,995,740 acres as compared with 9,139,000 acres in 1933.

* Abridged from the Rice Summary for February 1935, compiled by the Department of Statistics, Straits Settlements and Federated Malay States.

† It is to be understood throughout the summary that all comparisons and percentage increases or decreases are in relation to the corresponding period of 1934.

According to the same authority gross imports of rice into Java and Madura during 1934 totalled 61,500 metric tons as compared with 105,900 metric tons in 1933, a decrease of 41.9 per cent.

Ceylon. Imports during January and February were 84,912 tons, an increase of 2.7 per cent. as compared with the previous year. Of this year's imports 13.5 per cent. were from British India, 71.2 per cent. from Burma, 1.6 per cent. from the Straits Settlements and 13.7 per cent. from other countries. The 1934 relative percentages were 14.7, 70.3, 0, and 15 per cent. respectively.

Europe and America.—Shipments to Europe from the East for the period 1st January to 14th February 1935 were 78,526 tons, an increase of 36.8 per cent. as compared with 1934.

Of the 1935 shipments 7 per cent. were from Burma, 80.8 per cent. from Saigon, 11.3 per cent. from Siam and 0.9 per cent. from Bengal. The 1934 percentages were 10.9, 74.1, 12.1 and 2.9 respectively.

Shipments from the East to the Levant for the period 1st to 26th January 1935, were 3,900 tons as compared with 123 tons in 1934.

Shipments to the West Indies and America for the same period in 1935 were 2,450 tons as compared with 49 tons in 1934.

Correction.

General Rice Summary, January 1935.

First Forecast of the Rice Crop of Siam: "total production at 64,800,000 tons of rice and rice products" should read "64,800,000 piculs or 3,857,143 tons".

MALAYAN AGRICULTURAL EXPORTS, FEBRUARY, 1935.

PRODUCT.	Net Export in Tons.				
	Year 1934.	Jan.-Feb. 1934.	Jan.-Feb. 1935.	February 1934.	February 1935.
Arecanuts ...	18,882	7,444	3,624	3,832	856
Coconuts, fresh † ...	100,826†	14,544†	14,745†	8,029†	7,593†
Coconut oil ...	25,485	3,867	4,565	2,104	2,061
Copra ...	95,618	17,054	23,090	7,791	11,904
Gambier, all kinds ...	2,170	328	422	155	182
Oil cakes ...	11,273	2,397	1,775	1,214	852
Palm kernels ...	3,196	346	560	186	215
Palm oil ...	15,852	1,664	3,176	1,367	1,911
Pineapples canned ...	66,633	8,832	9,624	4,165	5,156
Rubber † ...	479,371†	83,605†	67,130†	41,832†	30,109†
Sago,—flour ...	10,503	1,088	2,706	437*	799
" —pearl ...	6,177	475	789	220	286
" —raw ...	7,079*	768*	1,140*	304*	444*
Tapioca,—flake ...	5,761	1,179	396	530	159
" —flour ...	1,842*	213*	115*	29*	148
" —pearl ...	15,770	2,333	2,011	1,234	1,052
Tuba root ...	481	106½	136½	62	95½

† hundreds in number.

* net imports.

† production.

MALAYAN PRODUCTION IN TONS OF PALM OIL AND KERNELS
(As declared by Estates)

Month	Palm Oil		Palm Kernels	
	F.M.S.	U.M.S.	F.M.S.	U.M.S.
January, 1935 ...	1,062.3	339.3	174.0	49.6
February 1935 ...	977.4	220.9	161.7	38.5
Total—January and February	2,039.7	560.2	335.7	88.1
January, 1934 ...	926.0	166.3	152.9	30.8
February 1934 ...	849.7	129.9	131.6	27.3
Total—January and February	1,775.7	296.2	284.5	58.1
Total for year 1934 ...	12,963	4,510	2,013	795

MALAYA RUBBER STATISTICS

ACREAGES OF TAPPALE RUBBER NOT TAPPED ON ESTATES OF 100 ACRES AND OVER, FOR THE MONTH ENDING 28TH FEBRUARY, 1935.

STATE OR TERRITORY (1)	Acreage of Tappable Rubber end 1933 (d) (2)	ESTATES WHICH HAVE ENTIRELY CEASED TAPPING		ESTATES WHICH HAVE PARTLY CEASED TAPPING (a)		AREA OF TAPPALE RUBBER NEVER BEEN TAPPED			Percentage of (9) to (2) (10)
		Acreage (3)	Percentage of (3) to (2) (4)	Acreage (5)	Percentage of (5) to (2) (6)	Acreage (7)	Percentage of (7) to (2) (8)	Total (3) + (5) (9)	
STRAITS SETTLEMENTS :—									
Province Wellesley	44,285	505	1.1	8,432	19.0	644	1.5	8,937	20.2
Malacca	121,152	135	0.1	16,850	13.9	2,511	2.1	16,985	14.0
Penang Island	1,366	126	9.2	434	31.8	144	10.5	560	41.0
Singapore Island	28,842	1,996	6.9	6,881	23.6	734	2.5	8,797	30.5
Total S.S.	195,645	2,762	1.4	32,517	16.6	4,033	2.1	35,279	18.0
FEDERATED MALAY STATES :—									
Perak	260,595	2,621	1.0	40,880	15.7	14,505	5.6	43,501	16.7
Selangor	310,003	4,933	1.6	44,992	14.5	12,891	4.2	49,925	16.1
Negeri Sembilan	233,592	5,865	2.5	35,449	15.2	14,284	6.1	41,314	17.7
Pahang	46,712	4,357	9.3	16,196	34.7	11,101	23.8	20,553	44.0
Total F.M.S.	850,902	17,776	2.1	137,517	16.2	52,781	6.2	155,293	18.3
UNFEDERATED MALAY STATES :—									
Johore	365,400	8,694	2.4	27,087	7.4	21,616	5.9	35,781	9.8
Kedah (b)	126,588	1,798	1.4	28,886	22.8	19,591	15.5	30,684	24.2
Kelantan	25,793	5,084	19.7	622	2.4	5,084	19.7	5,706	22.1
Tringganu (b)	4,543	Nil	Nil	98	2.2	98	2.2	98	2.2
Perlis (c)	1,181	Nil	Nil	543	46.0	Nil	Nil	543	46.0
Brunei	4,491	Nil	Nil	1,478	29.6	874	17.5	1,478	29.6
Total U.M.S.	528,496	15,576	2.9	58,714	11.1	47,263	8.9	74,290	14.0
TOTAL MALAYA	1,575,043	36,144	2.3	228,748	14.5	104,077	6.6	264,862	16.8

Notes :—(a) Area out of tapping on Estates which have partly ceased tapping refers to areas definitely being rested and excludes areas on any tapping round.

(b) Registered Companies only.

(c) Rentered quarterly.

(d) Figures are as reported by estate managers.

TABLE I
MALAYA RUBBER STATISTICS
STOCKS, PRODUCTION, IMPORTS AND EXPORTS OF RUBBER, INCLUDING LATEX, CONCENTRATED LATEX AND REVERTEX,
FOR THE MONTH OF FEBRUARY, 1935 IN DRY TONS.

FOR THE MONTH OF FEBRUARY, 1935 IN DRY TONS.

State Territory	Stocks at beginning of month 1		Production by Estates of 100 acres and over		Production by Estates of less than 100 acres estimated 2		Imports		Exports including re-exports				Stocks at end of month			
	Ports	Dealers	Estates of 100 acres and over	during the month	January 1935	during the month	during the month		January 1935		during the month		Ports	Dealers		
							Foreign	From Malay States and Labuan 10	Foreign	Malay States and Labuan 10	Foreign	Local			Foreign	Local
MALAY STATES :—	2	3	4	5	6	7	8	9	11	12	13	14	15	16	17	
Federated Malay States	...	12,812	10,040	10,001	23,287	6,103	19,449	Nil	Nil	Nil	14,018	3,033	31,953	6,245	12,289	9,607
Johore	...	2,892	3,123	3,197	7,400	3,485	7,923	Nil	16	59	2,983	4,765	4,950	5,552	2,445	3,150
Kedah	...	366	2,060	2,182	5,269	925	2,131	Nil	Nil	Nil	1,538	1,877	3,938	3,711	1,668	254
Perlis	...	18	21	10	33	17	27	Nil	Nil	Nil	26	Nil	69	19	21	21
Kelantan	...	294	180	343	663	438	868	Nil	Nil	Nil	86	751	224	1,223	198	220
Trengganu	...	55	50	283	479	142	240	Nil	Nil	Nil	Nil	425	Nil	59	50	50
Brunei	...	21	26	51	106	29	130	Nil	Nil	Nil	Nil	106	Nil	21	32	32
Total Malay States	...	16,388	15,500	16,067	37,230	11,773	23,831	Nil	16	59	17,925	10,983	40,025	21,720	15,279	14,948
S. SETTLEMENTS :—	...	3,443	1,090	1,149	2,794	761	1,295	Nil	Nil	Nil	3,013	6,584	6,775	13,561	3,208	1,150
Province Wellesley	...	1,695	500	425	1,000	194	364	Nil	Nil	Nil	6,381	13,561	13,561	13,561	1,802	473
Penang	...	3,070	12,862	12	13	43	65	11,719	4,773	23,188	Nil	Nil	Nil	2,972	13,126	196
Singapore	...	5,951	37,726	193	190	434	86	28,045	594	Nil	22,668	46,246	46,246	3,582	38,506	196
Labuan	...	41	Nil	Nil	Nil	13	25	166	Nil	Nil	594	Nil	Nil	3,582	38,506	196
Total Straits Settlements	...	9,021	53,767	1,795	1,770	4,199	1,099	11,719	33,352	23,188	32,465	Nil	67,085	5,954	56,679	1,835
TOTAL MALAYA	9,021	72,155	17,995	17,837	41,490	12,272	25,701	17,842	11,735	23,247	50,890	23,247	107,110	21,233	31,428	16,783

Figures for the Findings in columns 3 to 8 are included under F.M.S. with effect from 1st January, 1935.

TABLE II
DEALERS' STOCKS IN DRY TONS

Class of Rubber	Federation of Malay States		Province of Selangor		Province of Johore		Province of Kedah	
	20	21	22	23	24	25	26	27
DRY RUBBER	11,216	84,191	11,615	4,780	1,850	148	148	148
WET RUBBER	1,073	4,315	1,511	286	595	109	109	109
TOTAL	12,289	88,506	13,126	5,066	2,445	254	254	254

Notes :-

1. Stocks on estates of less than 100 acres and stocks in transit on rail, road or local steamer are not ascertained.
2. The production of estates of less than 100 acres is estimated from the formula : Production + Imports + Stocks at beginning of month = Production + Imports + Stocks at end of month. For Consumption, i.e., Column (9) = Columns (15) + (16) + (19) + (21) + (23) + (24) + (25) + (26) + (27) + (28) + (29) + (30) + (31) + (32).
3. Dealers' stocks in the Federated Malay States are reduced to dry weights by the following fixed ratios: unsmoked sheet, 15% wet sheet, 25% scrap, lump, etc., 40%; stocks elsewhere are in dry weights as reported by the dealers.
4. Column (32) and (32) represent exports of rubber subject to regulation which, for Singapore and Penang Islands are represented by sales or exports as shown by cash paid.
5. The figures in certain omissions, is the Report published by the Registrar-General of Statistics, S.S. and F.M.S., at Singapore on 25 March, 1935.

TABLE III
FOREIGN EXPORTS

PORTS	For month ending	
	27	28
Singapore	34,303	74,238
Penang	11,169	24,814
Port Swettenham	4,467	9,371
Malacca	253	697
MALAYA	50,990	109,120

TABLE IV
DOMESTIC EXPORTS

AREA	For month ending	
	30	31
Malay States	28,908	59,581
Straits Settlements	31,849	57,585
MALAYA	60,757	117,166

METEOROLOGICAL SUMMARY, MALAYA, FEBRUARY, 1935.

LOCALITY.	AIR TEMPERATURE IN DEGREES FAHRENHEIT					EARTH TEMPERATURE		RAINFALL							BRIGHT SUNSHINE.					
	Means of			Absolute Extremes		At 1 foot	At 4 feet	Total.			Most in a day.	Number of days.				Total.	Daily Mean.	Per cent.		
	A.	B.	Min.	° F	° F			° F	in.	mm.		in.	Precipitation, 10 or more.	Thunderstorm.	Fog morning obs.				Gale force 8 or more.	
																				Max.
		° F	° F	° F	° F	° F	° F	° F	in.	mm.	in.	in.	in.	in.	in.	hrs.	hrs.			
Railway Hill, Kuala Lumpur, Selangor	92.4	71.7	82.1	95	68	88	74	84.5	84.6	11.85	301.0	2.24	19	19	3	6	1	219.85	7.85	65
Bukit Jeram, Selangor	89.2	72.3	80.7	91	71	86	74	85.9	85.6	4.40	111.8	1.58	15	10	4	1	1	246.55	8.81	73
Sitiawan, Perak	90.4	72.5	81.5	93	70	88	75	84.4	84.8	2.70	68.6	0.87	11	9	2	1		243.85	8.71	73
Temerloh, Pahang	88.3	70.8	79.5	92	67	84	78	83.6	84.5	2.83	71.9	0.62	12	10		8		211.05	7.54	63
Kuala Lipis, Pahang	87.9	70.0	78.9	91	67	85	73	82.3	83.0	2.15	54.6	0.53	10	9		17		196.35	7.01	58
Kuala Pahang, Pahang	84.6	74.5	79.5	86	70	83	79	84.5	84.3	2.44	62.0	0.87	11	9				245.45	8.77	73
Kallang Aerodrome, Spore	87.2	73.7	80.5	91	71	75	76	81.8	82.8	5.31	134.9	1.73	11	9				204.70	7.31	60
Butterworth, Province Wellesley	89.4	71.7	80.5	94	69	86	75	85.0	85.0	2.46	62.5	0.70	9	8				277.60	9.91	83
Bayan Lepas Aerodrome, Penang	89.5	72.0	80.7	94	68	86	75	84.0	84.4	1.74	44.2	0.96	6	6	1			274.05	9.79	82
Bukit China, Malacca	88.3	72.9	80.6	94	72	81	75	84.0	84.3	4.74	120.4	1.64	12	12	1			213.55	7.63	63
Kluang, Johore	88.4	70.4	79.4	92	67	80	72	80.6	81.2	6.18	157.0	2.60	12	11		4		208.45	7.44	61
Bukit Lalang, Mersing, Johore	83.1	70.6	76.9	86	65	80	75	79.3	79.5	9.51	241.5	2.88	11	10		2		236.70	8.45	70
Alor Star, Kedah	92.1	68.7	80.4	94	66	89	73	83.0	83.9	1.61	40.9	0.75	5	5	3	1	1	263.75	9.42	79
Kota Bharu, Kelantan	85.8	69.5	77.7	88	64	83	78	80.4	82.1	3.87	98.3	1.95	7	5		4		236.00	8.43	71
Kuala Trengganu, Trengganu HILL STATIONS.	85.0	69.8	77.4	87	66	81	75	80.9	82.1	5.64	143.3	2.28	14	12		2		244.65	8.74	73
Fraser's Hill, Pahang 4268 ft.	71.4	60.7	66.1	74	59	65	63	71.3	71.4	11.84	300.7	2.47	16	14		21		160.55	5.73	48
Cameron Highlands, Tanah Rata, Pahang 4750 ft.	73.6	52.6	63.1	77	44	69	62	68.9	68.5	3.48	88.4	1.24	13	9	1			189.50	6.77	56
Cameron Highlands, Rhododendron Hill, Pahang 5120 ft.	73.4	58.1	65.7	77	56	67	60			3.62	92.0	1.26	11	9				206.70	7.38	61

Compiled from Returns supplied by the Meteorological Branch, Malaya.

TABLE I
MALAYA RUBBER STATISTICS
STOCKS, PRODUCTION, IMPORTS AND EXPORTS OF RUBBER, INCLUDING LATEX, CONCENTRATED LATEX AND REVERTEX,
FOR THE MONTH OF FEBRUARY, 1935 IN DRY TONS.

State or Territory	Stocks at beginning of month 1		Production by dealers and over-estimated 2		Imports		Exports including re-exports		Stocks at end of month	
	Dealers	Estates of 100 acres and over	during the month	January 1935	Foreign	From States & Labuan	Foreign	Local	Ports	Dealers
	2	3	4	5	6	7	8	9	10	11
MALAY STATES :-										
Federated Malay States	12,812	10,040	23,987	6,108	12,442	NH	NH	14,018	3,083	31,563
Malacca	8,892	3,123	3,197	2,400	4,485	NH	16	2,283	4,765	4,520
Penang	3,366	2,060	2,182	3,969	2,161	NH	NH	1,588	1,877	3,398
Perlis	18	21	10	33	17	NH	NH	NH	26	NH
Kelantan	294	180	343	663	438	NH	NH	86	751	224
Tringganu	55	50	283	479	142	NH	NH	NH	425	NH
Brunei	21	26	51	106	59	NH	NH	NH	106	NH
Total Malay States	16,388	15,500	37,230	11,173	23,831	NH	16	17,925	10,983	40,023
S. SETTLEMENTS :-										
Malacca	3,443	1,090	1,142	2,734	761	1,295	NH	3,013	6,584	3,013
Province Wellesley	1,695	500	425	1,000	194	364	NH	13,564	NH	13,564
Penang	12,862	12	13	31	43	65	4,773	22,188	NH	22,188
Singapore	9,591	37,726	193	190	434	12,152	28,045	22,884	NH	22,884
Labuan	41	NH	NH	15	25	166	334	NH	NH	NH
Total Straits Settlements	9,021	55,767	1,795	1,770	4,199	1,870	17,842	33,352	23,188	32,465
TOTAL MALAYA	9,021	72,155	17,295	17,837	41,429	12,272	55,701	17,842	11,734	33,352

† Figures for the Findings in columns 3 to 8 are included under F.M.S. with effect from 1st January, 1935.

TABLE II
DEALERS' STOCKS, IN DRY TONS

Class of Rubber	Federated Malay States	Penang	Province Wellesley	Kedah
20	21	22	23	24
DRY RUBBER	11,216	84,101	11,615	148
WET RUBBER	1,073	4,315	1,511	106
TOTAL	12,289	88,416	13,126	254

TABLE III
FOREIGN EXPORTS

PORTS	For month	For month
27	1935	1934
Singapore	24,308	74,238
Penang	11,162	22,814
Port Swettenham	4,667	9,371
Malacca	253	687
MALAYA	50,390	107,110

TABLE IV
DOMESTIC EXPORTS

AREA	For month	For month
80	1934	1935
Malay States	28,903	57,585
Straits Settlements	2,940	2,940
MALAYA	31,843	60,525

Note: 1. Stocks on estates of less than 100 acres and stocks in transit on rail, road or local steamer are not ascertained.

2. The production of estates of 100 acres and over is estimated from the formula: $\frac{\text{Production of 100 acres} \times \text{Number of estates}}{100}$. Exports + Stocks at end of month. For the Straits Settlements the production of estates of less than 100 acres is represented by sales or imports as shown by cess paid.

3. Dealers' stocks in the Federated Malay States are reduced to dry weights by the following fixed ratios: unsmoked sheet, 15% wet sheet, 25% (unsmoked), 40% (smoked), stocks elsewhere are in dry weights as reported by the dealers themselves.

4. Consumption of rubber subject to regulation which, for Singapore and Penang Islands are represented by sales or imports as shown by cess paid.

5. The above, with certain omissions, is the Report published by the Registrar-General of Statistics, S.S. and F.M.S., at Singapore on 25 March, 1935.

METEOROLOGICAL SUMMARY, MALAYA, FEBRUARY, 1935.

LOCALITY.	AIR TEMPERATURE IN DEGREES FAHRENHEIT					EARTH TEMPERATURE		RAINFALL					BRIGHT SUNSHINE.							
	Means of			Absolute Extremes			At 1 foot	At 4 feet	Total	Most in a day.	Number of days.			Total.	Daily Mean.	Per cent.				
	A.	B.	Min.	Highest	Lowest	Max.					Lowest	High.	Precipitation, in or more				Thunder-storm	Fog mornings obs.	Gale force 8 or more	
	°F	°F	°F	°F	°F	°F	°F	°F	in.	mm.	in.	in.	in.	Hrs.	Hrs.					
Railway Hill, Kuala Lumpur, Selangor	92.4	71.7	82.1	95	68	88	74	84.5	84.6	11.85	301.0	2.24	19	19	3	6	1	219.85	7.85	65
Bukit Jeram, Selangor	89.2	72.3	80.7	91	71	86	74	85.9	85.6	4.40	111.8	1.58	15	10	4	1	1	246.55	8.81	73
Sitiawan, Perak	90.4	72.5	81.5	93	70	88	75	84.4	84.8	2.70	68.6	0.87	11	9	2	1		243.85	8.71	73
Temerloh, Pahang	88.3	70.8	79.5	92	67	84	78	83.6	84.5	2.83	71.9	0.62	12	10		8		211.05	7.54	63
Kuala Lipis, Pahang	87.9	70.0	78.9	91	67	85	73	82.3	83.0	2.15	54.6	0.53	10	9		17		196.35	7.01	58
Kuala Pahang, Pahang	84.6	74.5	79.5	86	70	83	79	84.5	84.3	2.44	62.0	0.87	11	9				245.45	8.77	73
Kallang Aerodrome, S'pore	87.2	73.7	80.5	91	71	75	76	81.8	82.8	5.31	134.9	1.73	11	9				204.70	7.31	60
Butterworth, Province Wellesley	89.4	71.7	80.5	94	69	86	75	85.0	85.0	2.46	62.5	0.70	9	8				277.60	9.91	83
Bayan Lepas Aerodrome, Penang	89.5	72.0	80.7	94	68	86	75	84.0	84.4	1.74	44.2	0.96	6	6	1			274.05	9.79	82
Bukit China, Malacca	88.3	72.9	80.6	94	72	81	75	84.0	84.3	4.74	120.4	1.64	12	12	1			213.55	7.63	63
Kluang, Johore	88.4	70.4	79.4	92	67	80	72	80.6	81.2	6.18	157.0	2.60	12	11		4		208.45	7.44	61
Bukit Lalang, Mersing, Johore	83.1	70.6	76.9	86	65	80	75	79.3	79.5	9.51	241.5	2.88	11	10		2		236.70	8.45	70
Alor Star, Kedah	92.1	68.7	80.4	94	66	89	73	83.0	83.9	1.61	40.9	0.75	5	5	3	1	1	263.75	9.42	79
Kota Bharu, Kelantan	85.8	69.5	77.7	88	64	83	78	80.4	82.1	3.87	98.3	1.95	7	5	4			236.00	8.43	71
Kuala Trengganu, Trengganu HILL STATIONS.	85.0	69.8	77.4	87	66	81	75	80.9	82.1	5.64	143.3	2.28	14	12		2		244.65	8.74	73
Fraser's Hill, Pahang 4268 ft.	71.4	60.7	66.1	74	59	65	63	71.3	71.4	11.84	300.7	2.47	16	14		21		160.55	5.73	48
Cameron Highlands, Tanah Rata, Pahang 4750 ft.	73.6	52.6	63.1	77	44	69	62	68.9	68.5	3.48	88.4	1.24	13	9	1			189.50	6.77	56
Cameron Highlands, Rhododendron Hill, Pahang 5120 ft.	73.4	58.1	65.7	77	56	67	60			3.62	92.0	1.26	11	9				206.70	7.38	61

Compiled from Returns supplied by the Meteorological Branch, Malaya.

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THE Malayan Agricultural Journal.

MAY, 1935.

EDITORIAL.

Malayan Fruit Canning.

Articles have been published in the last two numbers of this Journal on various aspects of the Malayan pineapple canning industry. In the March number a brief account was given of the local cultivation of this crop and of factory methods employed. The April number included an article on the trade in canned fruits in the United Kingdom which shewed the very important share which the Malayan product has in this market. In the present issue we present an article which recounts the methods employed in fruit canning in the United Kingdom. Two further articles are to appear in subsequent numbers dealing respectively with the organisation and control of fruit canning in the United Kingdom and the present position of the Malayan pineapple canning industry.

The articles combined will then shew and contrast the methods employed in this country and in the country to which the bulk of our produce is consigned and will demonstrate the lines along which the Malayan canned pineapple industry should develop in order to maintain its present markets and establish new connexions in the face of growing competition.

The author of the articles on the United Kingdom conditions has had the benefit of much valuable assistance from numerous officials and unofficials in England who have not only placed information at his disposal, but have given him the benefit of reading the articles and making a number of useful criticisms and emendations.

In the course of his personal enquiries in the United Kingdom the author was offered many views and criticisms concerning Malayan canned pineapples. Some of these are discussed in these articles, others have been noted for reference to the trade in this country.

In most countries in which fruit canning is practised, canners do not confine themselves to one description of fruit, but handle various kinds at different seasons. The question naturally arises whether there are other fruits which are grown or are capable of being grown in Malaya which are suitable for canning and might command a market. The fruit that stands out in this respect is the China (Mandarin) orange which grows and bears fairly well in

Malaya. This fruit is being extensively canned and exported from Japan at the present time and there does not seem to be any obvious reason why the canning of it should not be developed in Malaya.

Grape fruit also does fairly well in Malaya, and although there may be some doubt as to the possibility of developing a trade in fresh fruit, there should be possibilities of establishing an export trade in canned grape fruit, the popularity of which is steadily increasing.

A fruit which may possess possibilities in this direction is the papaya (papaw). So far no attempts have been made to can it and it is possible that it might disintegrate during the cooking process. On the other hand, it is a very usual and acceptable ingredient of fruit salad in the tropics and, if it could be satisfactorily canned and exported, might find a ready market.

Experimental work on the canning of other tropical fruits might also be worth undertaking, especially in view of the gluts which occur at certain seasons.

The appointment of a research chemist for the Malayan canning industry which has been approved by the Governments concerned should prove of great value to the pineapple canning trade. His services should also be useful in connexion with investigations on the possibility of utilizing other Malayan fruits in the canning industry.

Control of Copra Beetles.

Information was sought in 1932 by a company in Singapore regarding beetles infesting their copra stores from whence they spread to private houses in the vicinity, thereby causing great annoyance.

Recommendations were made, and it was pointed out that damp and mouldy copra is particularly conducive to the breeding of certain insects, and that copra from old nuts is less liable to attack than that from young and insufficiently dried nuts.

In November 1933, the President, Municipal Commissioners, Penang, sought assistance regarding the problem of "copra bugs" in Penang, stating that, owing to the slump in the copra market, a very large stock of copra had accumulated and the business area of the town was infested with these insects.

Considerable work has been done by this Department on insects associated with copra, and the results will probably be published during this year, but in so far that attention has comparatively recently been drawn to the nuisance occasioned by *Necrobia* (the copra beetle), an article on this subject is published in this place.

The author concludes that traps and fumigation to rid copra stores of the copra beetle are only a palliative and not recommended except under exceptional circumstances, but that the production of copra of good quality would obviate trouble from this source.

Original Articles.

THE CANNING OF FRUIT IN THE UNITED KINGDOM

BY

H. A. TEMPANY,

Director of Agriculture, S.S. and Adviser on Agriculture, Malay States.

The British fruit canning industry has an annual output of about 700,000 cwts. of canned fruit. There are seventy-four factories canning fruit in England and Wales, five or six in Scotland and one in Northern Ireland. The English factories occur throughout the country, but tend to be grouped in the principal fruit-growing districts.

The fruit treated consists mainly of soft fruits and plums, the only hard fruit canned being apples. As the different kinds of fruits succeed one another in order of ripening most factories handle a considerable succession of fruits in one season. Many of the factories combine the canning of vegetables with that of fruit, thus serving to extend the working period.

Factories vary considerably in size and in equipment; the tendency is towards steady improvement in the latter respect, the work of the Ministry of Agriculture in connexion with the National Mark scheme and that of the Fruit and Vegetable Preservation Research Station at Campton having played an important part in this.

The lay-out and design of canning factories is of great importance as on them depends the ability to control the various operations and ensure proper economy in working.

The standard lay-out is in lines running through the factories along which the fruit progresses through the various operations until the finished product emerges at the end. Typical canning factories are long buildings, usually built of brick or galvanised iron with overhead lights. Produce is delivered at one end, proceeds through the factory during the course of manufacture, the finished article being delivered to store at the other; stores are situated usually at one end of the factory or at the side so as to facilitate storage and delivery to railway or delivery vans.

Fruit for canning is grown under a definite contract drawn up between the grower and the canner, or it is purchased at an agreed price during, or just previous to, the canning season. In either case the canner stipulates that the fruit must be of the requisite variety and quality for canning, and when contracts are made it is customary to arrange for an arbitrator who can be called upon in the event of a dispute. Deliveries are made in chip baskets, trays or crates, the type of container depending on the nature of the fruit, and transport is generally by motor lorries, although rail transport is sometimes used. On arrival at the cannery each consignment is weighed and inspected to ensure that the variety is correct and the quality up to standard.

In the case of apples the fruit is peeled, cored and quartered by machinery, although in some cases parts of the operations are performed by hand. The peeling machine in its various forms is a simple but ingenious form of mechanism; it is, however, probably not sufficiently robust to be capable of being applied to pineapples. In Hawaii a sizing, peeling and coring machine is used for pineapples, but it seems open to doubt whether it could, under Malayan conditions, compete with hand peeling. Hand peeling seems to be little open to objection provided it is carried out under satisfactory conditions. In America, the peeling of pears for canning is stated to be largely performed by hand.

Soft fruits and plums are carefully sorted, and any damaged or blemished fruits are removed. A preliminary preparation is also carried out where necessary; strawberries and plums are graded, generally followed by a thorough washing in running water.

The fruit is then conveyed to the packing tables, endless belt conveyors being usually employed for the purpose. During its transit the fruit is subjected to further inspection to ensure that all material going to each particular line conforms to the grade that is there being packed, the operators picking out all unsuitable pieces.

On arrival at the packing table the fruit is packed into cans which are conveyed to the packers by some form of automatic conveyor, very often of the endless band or endless rope or chain type; packers either remove the cans from the conveyors by hand or they may be fed down automatically by some form of gravity conveyor with a control stop. After filling, the cans are placed by the operators on another conveyor and then proceed on their journey to the various stages of the processing operation. It is noteworthy that after they have left the hands of the fillers the cans and their contents are not touched by hand again until the product is ready for the store.

The processing plant consists of syruping machines which automatically deliver the correct amount of syrup to the cans, exhausters which heat the cans by steam to a temperature of about 80°C. to exhaust the air, automatic seamers which place the lids on the cans and seal them, cookers in which the sealed cans are cooked, coolers in which they are subsequently cooled to a temperature of about 35°C. and labellers in which the labels are applied to the finished cans.

The exhausting process takes from five to ten minutes and the cooking about five to twenty-five minutes, the length of the operation varying according to the size of the cans handled and the nature of the fruit.

The operations of processing are controlled in some cases by means of temperature tests, sample cans being regularly tested by means of thermometers. The extension of this practice in British canneries is a fairly recent introduction. In the most efficient and up-to-date canneries a laboratory is provided, and a staff of chemists supervise and control the operations in the various stages.

Sugar is dissolved in water in glass, enamel-lined, or stainless steel tanks to give the requisite density of syrup required. The tanks are usually fitted with a steam heated coil to get the sugar quickly into solution and the syrup is clarified by passing it through thick flannel, muslin or fine wire gauze before it is used to fill the cans. It is applied to the fruit at a temperature of about 76°C.

Cans are seldom made in the canning factory; most canners purchase their supplies from one of the can-making companies; of these by far the largest is The Metal Box Company, Limited, which supplies about 80 per cent. of the cans used in Great Britain. This company operates two can-making factories in England, and both are equipped with a number of can-making lines of machinery, each of which turns out complete cans at the rate of three hundred per minute.

The empty cans are transported to small canneries in returnable cardboard containers holding about one to two hundred cans. Bulk supplies for the larger factories are packed in railway trucks, and when the latter reach their destination the cans are transported automatically direct from the truck to the empty can store. Thus there is no work in the cannery connected with the cans apart from the fixing of the lids on the filled cans, and this is carried out by means of semi-automatic or fully automatic can-closing machines. These are supplied to the canners by the can-makers, who maintain a trained staff to help the canner to keep the machines in thorough working order.

Operatives in canneries are mainly girls who perform all operations concerned with the handling of the fruit and its packing. They are required to wear overalls and caps.

Disposal of Waste in Canning Factories.

In pineapple canneries in Malaya the disposal of waste material is a problem of some importance. In English and other canning factories waste material is utilised so far as possible for the manufacture of by-products; among these are included fruit pulp, pectin, jam and similar preserves, and fruit juices. In this way practically all the waste material is employed, special machinery being installed to deal with it. In Hawaii, pineapples are canned in a mixture of syrup and pineapple juice; waste fruit material is made into pulp and jam, the peel being converted into pineapple bran and used as a feeding stuff.

With the marginal profits which the Malayan industry has to face at present, the possibilities of additional profits, which the utilisation of by-products may bring, should not be neglected, and attention to this aspect of the industry is an obvious requirement.

Canned Fruit Salad.

Formerly canned fruit salad was exclusively an imported article in Great Britain but now it is being manufactured on an increasing scale in England and its popularity is steadily growing.

In preparing it the various canned fruits utilised are purchased by the manufacturer in separate containers, which are opened in the factory, and salad compounded in accordance with the formula employed, the product being repacked in fresh tins which are re-processed and labelled.

In all fruit salad formulae pineapple is an essential ingredient and comprises about ten per cent. of the total contents. Formerly Hawaiian pineapple was exclusively employed but latterly the trade has taken to using Malayan pineapple on account of its lower price and of its being admitted to the United Kingdom without payment of duty. The packers' requirement in this respect is high quality golden yellow slices packed in special sized containers; at times packers experience difficulty in obtaining material that is entirely reliable which meets their needs in all respects and it would seem that opportunity may here exist for canalising trade between the canners in Malaya and the factory consumers with advantage to both.

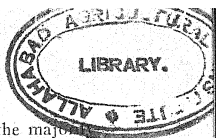
Research in Relation to the Canning Industry in Great Britain.

An important feature of the British canning industry is the part played by the Fruit and Vegetable Preservation Research Station at Campden in Gloucestershire. The premises were purchased by the Government towards the end of the War for the production of jam and dried vegetables for the troops, and in 1921 they were transferred to the University of Bristol for investigational work on the preservation of horticultural produce. Actual research work, however, only commenced in 1923 when two research workers were appointed.

The Institution occupies large and convenient premises, and at present possesses a staff of six scientific workers. Separate laboratories are equipped for the study of chemical, bio-chemical, physical and bacteriological problems in connection with canning. There are also experimental canning rooms fitted with the necessary machinery for the canning of fruits, vegetables and other products, and a room for the examination of National Mark samples.

The cost of maintaining the Station is about £4,800 a year, of which about two-thirds are contributed in the form of a block Grant from the Ministry of Agriculture and Fisheries, the remainder being made up by subscriptions from various canning undertakings throughout the country.

The Station is attached to the University of Bristol for administrative purposes, and is controlled by a Management Committee comprising representatives of the Ministry of Agriculture, the University of Bristol, and the canning industry and allied trades. Close contact with the industry is main-



tained through a Technical Advisory Committee, which comprises the majority of the qualified technical men engaged in the canning of fruits and vegetables in England.

The work of the Station comprises educational, advisory and research work, and the examination of samples under the National Mark scheme. In 1933 over 1,000 enquiries were attended to, and 550 persons visited the Station, while 48 visits of inspection were made to factories by officers of the staff. Under the National Mark scheme 2,400 samples were examined. In addition, short courses of instruction on the principles of canning were given to members of the staffs of canning firms, and a number of lectures were delivered at various centres.

The range of research problems dealt with by the Station is wide and covers a large number of points connected with the industry. The outstanding problems are concerned with horticulture, nutrition, bacteriology, physiology, chemistry, physics and metallurgy, and many of these are now being studied either at the Research Station or in close touch with other Research Institutes or technical bodies. At present the most urgent scientific problem is considered to be the discovery of the source of infection and method of eradication of a heat-resistant mould which causes serious losses in canned and bottled fruits.

Questions of heat-penetration during processing are also important and are being studied, while on the horticultural and agricultural side much work has been carried out in order to ascertain which varieties of fruits and vegetables are most suitable for canning. This question is still being investigated by the Campden Station in collaboration with Horticultural Stations and Agricultural Institutes in various parts of the country. Corrosion of cans is also being studied as well as the vitamin contents of canned foods, while many other points have been elucidated or are under study.

Technical advice based on the results of experiments and research is available to all subscribers, reports on the quality of canners' packs are given when required, and the industry looks to the Station for advice and guidance whenever problems or difficulties arise.

There is no question that the Station has played a very important part in the development of the British canning industry, and that it is now an essential factor in its maintenance.

THE ATTRACTION OF *NECROBIA RUFIPES* DE GEER. (THE COPRA BEETLE) TO THE FATTY ACIDS OF COCONUT OIL AND TO TYPES OF COPRA

BY

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Government Entomologist,

MOHAMED YUSOPE AND ABU HASSAN,

Malay Agricultural Assistants.

In January, 1931, a report entitled "Notes on the Copra Beetle, *Necrobia rufipes* de Geer." was received by the Department of Agriculture with a request that the method described therein be tested in Malaya. In this communication, oleic acid was stated to afford a most useful attractant to and method of control for *Necrobia* and that when about half an inch of oleic acid was placed in quart-sized containers with holes punched just about the level of the acid "so many beetles were trapped that the cartons were filled with them and the oleic acid spilled on the floor where it continued to attract large numbers of beetles". Suitable cartons at that time being unobtainable in Malaya, cigarette tins were employed. The first trial consisted in placing in a jar containing forty-eight *Necrobia* beetles, two cigarette tins with punctured lids, into one of which was poured a small quantity of oleic acid and into the other a similar quantity of water. The tins containing oleic acid and water trapped thirty-six and five beetles respectively through a period of thirty-nine days, and after that period seven beetles still remained in the common cage. In another experiment, valerianic acid* was compared with oleic acid and for this purpose sixty-three *Necrobia* beetles were introduced into a glass jar connected by rubber tubing to two flasks, one containing oleic and the other valerianic acid. On the next day, six *Necrobia* had entered the oleic and seventeen the valerianic trap, and on the following day, nine more *Necrobia* had entered the oleic and eighteen the valerianic flask. Thirteen still remained in the glass jar. The results from these two preliminary experiments were not considered as supporting the claim for oleic acid and since greater attraction might be shown under more natural conditions the next experiment was conducted in a copra store. For this purpose, oleic acid was compared with palmitic, stearic, (two other fatty acids of coconut oil), propionic, valerianic and butyric acids. In this copra store, one man could collect in glass vials about one hundred *Necrobia* beetles in ten minutes. The cigarette tins with punctured lids containing the six acids were hung on posts about five feet from the ground. The acids were changed weekly. Over a period of three weeks, thirty-seven *Necrobia* beetles were recorded in the oleic, eighteen in the valerianic, two in the propionic, six in the butyric, one in the palmitic and

* Valerianic acid was tried merely on the ground that it was available in the entomological laboratory.

none in the stearic acid traps. More *Necrobia* were trapped in the oleic than in any of the other acids, but, in view of the general presence of *Necrobia* throughout this store, its attraction to oleic acid was not considered high.

In a subsequent experiment conducted in the laboratory, 5 cc. of linoleic, valerician, oleic and caprylic acids, 5 gr. of lauric and myristic acids, a small quantity of the mycelium of the mould *Aspergillus cinnameus** and a damaged grub of *Necrobia* were contained in separate glass wells which, whilst admitting free entry, were sufficiently covered to prevent *Necrobia* beetles falling into them. On the following morning, two *Necrobia* beetles were observed in the linoleic, one in the valerician and five in the *Aspergillus cinnameus* cage. The grub of *Necrobia* had been devoured, the skin only remaining. No beetles were recorded in the oleic, caprylic or myristic cages.

In another experiment, which was triplicated, squares of about one inch cut from the same piece of good quality copra were treated individually with lauric, caprylic, linoleic, myristic and oleic acids and *Aspergillus cinnameus*. These squares, together with a square of copra with the superficial green mould, *Penicillium glaucum*, and of degenerated moist copra, were placed in a common cage. *Necrobia* beetles were afterwards introduced and their behaviour as to the number of visits to the squares was recorded.

Degenerated and pitted copra	<i>A. cinnameus</i>	Copra with <i>P. glaucum</i>	Myristic	Lauric	Linoleic	Caprylic	Oleic
125	109	79	68	52	20	19	10

This result indicates that degenerated pitted copra, copra with *A. cinnameus*, and copra with *P. glaucum* show most attraction and that the solid acids of coconut oil, *viz.* myristic and lauric, greater attraction than its liquid acids linoleic, caprylic and oleic.

Since more *Necrobia* beetles visited the pitted, mouldy, moist degenerated copra, a piece of mouldy and somewhat degenerated copra was divided into two squares, from one of which the mould was, as far as possible, scraped. These squares were then placed in a cage with squares of copra treated individually with five of the fatty acids of coconut oil and a square of good quality copra with a slight development of *Penicillium glaucum*. The number of visits by *Necrobia* was recorded with the following result:

*One of the moulds associated with copra.

Mouldy degenerated copra	Same as (1) with mould scraped off	Myristic acid	Lauric acid	Good copra with slight development of <i>P. glaucum</i>	Oleic acid	Caprylic acid	Linoleic acid
76	68	58	32	28	9	3	4

The removal of the fungus growth would not appear to have rendered the degenerated copra much less attractive to *Necrobia* and suggests that decomposition products of degenerated copra resulting from bacterial or fungoid activity attract *Necrobia* beetles, and that they are more prevalent in degenerated than in good quality copra although supporting a slight development of *Penicillium glaucum*. It will be observed that myristic and lauric acids, as in the previous experiment, show greater attraction than the liquid acids of coconut oil.

The fatty acids, myristic, lauric, oleic, linoleic and caprylic, were afterwards individually compared in separate cages with *Aspergillus cinnamomeus* as to their attraction for *Necrobia*. For instance, as shown in the following table, in the cage containing *A. cinnamomeus* and caprylic eleven *Necrobia* visited the *A. cinnamomeus* receptacle while two *Necrobia* visited the caprylic one. The number of visits by *Necrobia* is tabulated below :—

<i>A. cinnamomeus</i>	Caprylic	Oleic	Linoleic	Lauric	Myristic
11	2				
8		3			
12			2		
9				12	
10					10

More visits by *Necrobia* were made to lauric and myristic than to caprylic, oleic or linoleic acids and about the same number to lauric and myristic as to *Aspergillus cinnamomeus*.

Additional Experiments on the Attraction of *Necrobia*.

The previous experiments were completed in 1932 and indicated that oleic acid was not greatly attractive to *Necrobia*. In view, however, of the fact that it had been considered eminently attractive in England and that our observations were not confirmatory, the tin receptacles were thought to be responsible for the discrepancy in the results and cartons becoming available were employed to decide this in the following tests:—

Experiment I. This experiment was in progress from April 25th to June 8th, 1934, in a shop house in which sacks containing copra were stored. The sacks which were piled on top of each other almost reached the ceiling. No sacks were removed and the door was kept locked during the course of this experiment. Twenty-four cartons, half of which contained oleic acid and half the same quantity of castor oil, were used. Six cartons with oleic acid and six with castor oil were hung from a beam about one foot above the sacks and six cartons with oleic acid and six with castor oil were placed on the floor. *Necrobia* beetles were numerous. Six counts at weekly intervals were made with the following result:—

	Oleic acid	Castor oil
Cartons on Floor	432	166
Cartons from Beam	24	18

It will be observed that the position of the cartons influenced the result since more beetles were trapped or fell into the cartons placed on the floor than into those suspended from the beam. Oleic acid appears to be more attractive than castor oil. During the six weeks, the six cartons containing oleic acid on the floor caught 432 *Necrobia* beetles, an average per week of 72, or of 12 per carton per week.

Experiment II. This experiment was commenced in the same shop house on June 8th and terminated on July 6th, 1934. A weekly count was made, and castor oil was used for comparative purposes with oleic acid. Each type of cage was duplicated. Two glass beakers containing oleic acid and two containing castor oil were also included. Some cartons were covered and others uncovered, and in those covered and in some uncovered ones holes of the diameter of a pencil were punctured. To two uncovered cartons (6), to two uncovered but holed cartons (7) and to two covered but holed cartons (5) containing oleic acid and castor oil, bacterial slime from coconut meat was added. All containers were placed on the floor about one foot apart.

The result is tabulated below :—

	Number of <i>Necrobia</i> in Oleic acid	Number of <i>Necrobia</i> in Castor oil
1. In two beakers uncovered ...	92	96
2. In two cartons uncovered ...	167	109
3. In two cartons uncovered and holed ...	162	117
4. In two cartons covered and holed ...	25	8
5. In two cartons covered and holed and with bacterial slime added ...	44	40
6. In two cartons uncovered and bacterial slime added ...	144	160
7. In two cartons uncovered and holed and bacterial slime added ...	169	117

This result shows that uncovered cartons containing oleic acid or castor oil trapped more *Necrobia* than did the glass beakers, that covered cartons with holes were less efficient than uncovered cartons, that more *Necrobia* (803) were caught in oleic acid than in castor oil (647) and that the addition of bacterial slime possibly enhanced the attractiveness of oleic acid and castor oil. (cf. 4 and 5). In the eight uncovered cartons containing oleic acid, 642 *Necrobia* were recorded during a period of four weeks; this is equivalent to 20 *Necrobia* per carton per week and, in the eight uncovered cartons containing castor oil, 503 *Necrobia* were recorded during the same period, which is equivalent to 16 *Necrobia* per carton per week. Since *Necrobia* is very active and in its wanderings may have ascended and fallen into the cartons, the number attracted to oleic acid and castor oil may have been less than the above figures indicate. In the course of these experiments, cartons containing water have been found with an occasional *Necrobia*. The great attraction of *Necrobia* to oleic acid is not corroborated and the remark by a laboratory Malay Assistant to the effect that he could hand-collect more *Necrobia* beetles in five minutes than any container trapped in a week was much to the point.

Experiment III. In view of the possibility that oleic acid by exposure to the atmosphere or by the contamination of insects suffered some deterioration, an experiment was conducted for a period of four weeks in a copra store in which *Necrobia* beetles were numerous. Weekly records were made. The result is tabulated below :—



	Number of <i>Necrobia</i> attracted to Oleic acid	Number of <i>Necrobia</i> attracted to Castor oil	Number of <i>Necrobia</i> attracted to Coconut oil
1. Unused, without exposure. In cartons uncovered and unholed ...	81	50	88
2. Unused, exposed in glass beaker for 76 days. In cartons uncovered and unholed	87	48	
3. Unused, exposed in glass beaker for 76 days. In carton uncovered but holed ...	103	60	91
4. Unused, exposed in glass beaker for 76 days. In carton covered and holed ...	25	19	35
5. Unused, exposed in glass beaker for 32 days. In glass beaker ...	35	33	
6. Unused, exposed in carton for 32 days. In carton uncovered and holed ...	82	55	
7. Used in previous traps, and filtered. In carton uncovered and unholed ...	54	30	
8. Used in previous traps and filtered. In glass beaker ...	40	29	

In considering this result, the attraction of *Necrobia* to oleic acid and coconut oil is similar but seemingly (*vide* below) greater than to castor oil. The exposure to the atmosphere of oleic acid, castor oil and coconut oil would not appear to lessen their attractiveness but after being contaminated with insects the two former, especially oleic acid, appear to decrease in their attractiveness. More *Necrobia* beetles were recorded in uncovered than in covered but holed cartons and slightly more in uncovered and holed than in uncovered cartons. Glass vessels possibly owing to their smooth surface are not so suitable as cartons.

The largest number of *Necrobia* beetles (103) was caught in the uncovered but holed oleic acid trap through a period of four weeks, an average of twenty-six per week in a copra store where this beetle was numerous. Although oleic acid undoubtedly is attractive to *Necrobia* this attraction is by no means considerable and in view of this, the use of oleic acid as a control for *Necrobia* in Malaya is not recommended.

A further experiment was conducted in which more *Necrobia* beetles were recorded in cartons containing kerosene oil than in those containing oleic acid. Accordingly, another experiment was conducted to ascertain the behaviour of *Necrobia* beetles after having fallen into an acid or an oil. For this purpose, *Necrobia* beetles were dropped into cartons containing oleic acid, kerosene, coconut and castor oils and water. Observations showed that *Necrobia* beetles dropped in kerosene oil died immediately, in oleic acid and coconut oil they died almost immediately, and if they managed to crawl out and up the side of the carton they died; in castor oil 53 per cent. succumbed almost immediately, 7 per cent. crawled out but died on the sides of the container whilst 40 per cent. crawled out of the carton and escaped. From the carton containing water, all the beetles crawled out and escaped. It may therefore be reasonably assumed that no *Necrobia* escaped after falling into or after immersion in kerosene and coconut oils or oleic acid but some may have escaped from the castor oil, so that in Experiment III more *Necrobia* may have entered the castor oil cartons. If the 40 per cent. were added to the number of *Necrobia* beetles recorded in the castor oil, the difference in the catches in oleic acid, coconut and castor oils would not be markedly dissimilar.

The Attraction of *Necrobia rufipes* de Geer. and of other Insects associated with Copra to various Oils and their Fatty Acids.

With the exception of myristic and lauric acids, the other fatty acids* of coconut oil seem to possess little attraction for *Necrobia*, and since it was thought that the mixed fatty acids, and not any particular fatty acid, of coconut oil might be the attractant the following experiment was conducted in a copra store where *Necrobia* and other beetles associated with copra were numerous. Cigarette tins with perforated lids containing the oils and fatty acids were hung from posts about five feet from the ground. The traps were placed in position on February 29th, 1932 and examined three times at an interval of one week. The result is tabulated on the next page.

During a period of three weeks, forty-two and forty-one *Necrobia* beetles were trapped in the tins containing the mixed fatty acids of coconut and palm kernel oil respectively. In the tin containing oleic acid, one of the fatty acids common to both coconut and palm kernel oils, only seven *Necrobia* beetles were recorded. This result suggests that there may be present in the mixed fatty acids an attractant other than oleic acid, if indeed that acid may be termed an attractant, and it indicates that the mixed fatty acids of coconut and palm kernel oils possess a greater attraction than their oils and the oils and mixed fatty acids of groundnut, rubber seed and olive. However, since fifteen were the most caught in a trap in one week in a store where *Necrobia* was abundant, neither the mixed fatty acids of coconut nor of palm kernel oil can be seriously considered as a control for *Necrobia*.

*Caproic acid was not included in any of the experiments.

Date of Examination	March 7, 1932			March 14, 1932			March 21, 1932			Total		
	<i>Necrobia</i>	<i>Sitonaus advena</i>	<i>Carpophilus</i>	<i>Necrobia</i>	<i>Sitonaus advena</i>	<i>Carpophilus</i>	<i>Necrobia</i>	<i>Sitonaus advena</i>	<i>Carpophilus</i>	<i>Necrobia</i>	<i>Sitonaus advena</i>	<i>Carpophilus</i>
(1) Coconut oil ...	2	14	0	2	29	2	0	14	0	4	57	2
(2) Mixed fatty acids of (1) ...	14	51	2	13	151	2	15	69	0	42	271	4
(3) Ground nut oil ...	3	66	2	5	126	3	8	111	4	16	303	9
(4) Mixed fatty acids of (3) ...	4	31	0	2	49	1	0	34	1	6	114	2
(5) Palm kernel oil ...	1	79	0	2	133	0	0	68	0	3	280	0
(6) Mixed fatty acids of (5) ...	15	54	3	13	27	3	13	47	0	41	128	6
(7) Rubber seed oil ...	4	48	2	7	116	2	3	29	1	14	193	5
(8) Mixed fatty acids of (7) ...	0	82	7	1	74	7	3	89	5	4	245	19
(9) Olive oil ...	3	49	3	1	62	0	0	24	0	4	135	3
(10) Mixed fatty acids of (9) ...	1	13	0	0	38	0	0	34	0	1	85	0
(11) Palm oil ...	0	18	0	0	26	1	0	18	1	0	62	2
(12) Oleic acid ...	4	18	0	2	27	0	1	36	1	7	81	1
	51	523	19	48	858	21	43	573	13	142	1954	53

In addition to the above information, the result shows that three hundred and three and two hundred and eighty beetles of *Sitonaus advena* were recorded in the traps containing groundnut and palm kernel oils respectively. *Carpophilus dimidiatus*, which is most generally associated with wet mouldy copra, was not attracted in any significant degree to either of the oils or their fatty acids. Representatives of *Dermestes vulpinus* were recorded, the most (five) being caught in the trap containing the mixed fatty acids of palm kernel oil.

The Attraction of *Necrobia rufipes* de Geer. to Different Types of Copra.

In so far that oleic acid and the mixed fatty acids of coconut oil had not been proved to show pronounced attraction, and that degenerated mouldy copra appeared to possess greatest attraction, an experiment employing for comparative purposes oleic acid was conducted with different types of copra.

Mr. F. C. Cooke,* Officer-in-Charge, Copra Investigations, prepared and designated the various types of copra. The types of copra and the oleic acid were contained in open kerosene tins. These tins were placed about a yard apart on the top of sacks containing copra ready for shipment. *Necrobia* beetles were numerous in this store. At the time of inspection, all beetles within the tins containing the various types of copra were caught and those in the tin containing oleic acid were brushed into it. The oleic acid was filtered through gauze at each examination. The collections were recorded daily through a period of nine days and are given in the table on the next page and are also graphically represented.

Considerations of the Table and Graph.

Necrobia rufipes de Geer.

Necrobia rufipes undoubtedly prefers slimy, mouldy and wet copra to dry copra with or without surface moulds so that there would appear to be good grounds for supposing that decomposition products produced by fungi and bacteria attract this insect. The apparently greater attraction of hard, dried-up, slimy copra free from moulds over half-dry, slimy and mouldy copra may be due to decomposition having proceeded further in the former than in the latter.

In oleic acid twenty-seven *Necrobia* were collected, but in so far as in this number are included *Necrobia* beetles falling into the oleic acid during two hundred and sixteen hours, this number is probably greater than it should be. *Necrobia* in all other counts was only that number within the tin at the actual time of examination.

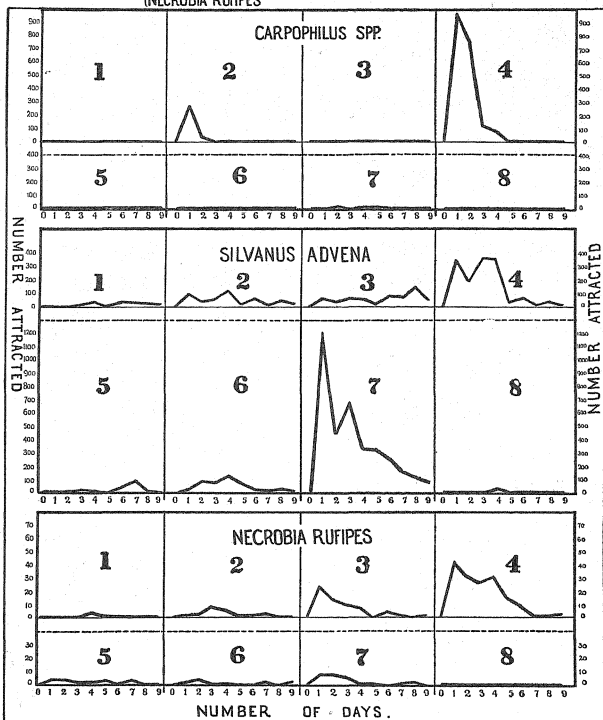
Grubs of *Carpophilus* were observed on the fifth day in the slimy and mouldy raw copra and on the seventh day in the half dried slimy and mouldy copra. *Necrobia*, being highly predacious on its own grubs as well as on the grubs of *Carpophilus*, was expected to increase in these two tins. The records, however, have not confirmed this and *Necrobia* would therefore appear to favour these types of copra for feeding and laying eggs and not for devouring grubs of *Carpophilus* and other insects.

Silvanus advena Walk.

Silvanus advena prefers soft, slimy and mouldy wet copra to hard, dry, slimy copra free from moulds, to dry copra with green mould, to half-dried, slimy and mouldy copra, to white, fresh, and dry copra and to old and dry estate copra, in descending order. The slight rise on the eighth day in the case of hard, dry, slimy copra and on the seventh day in that of fresh, dry copra is considered to be due to slight development of surface moulds, and the fall after the fourth day in the cases of half-dry, slimy and mouldy copra, of slimy, mouldy, raw copra and of dry copra with green mould to the removal of the mouldy growth by the insects.

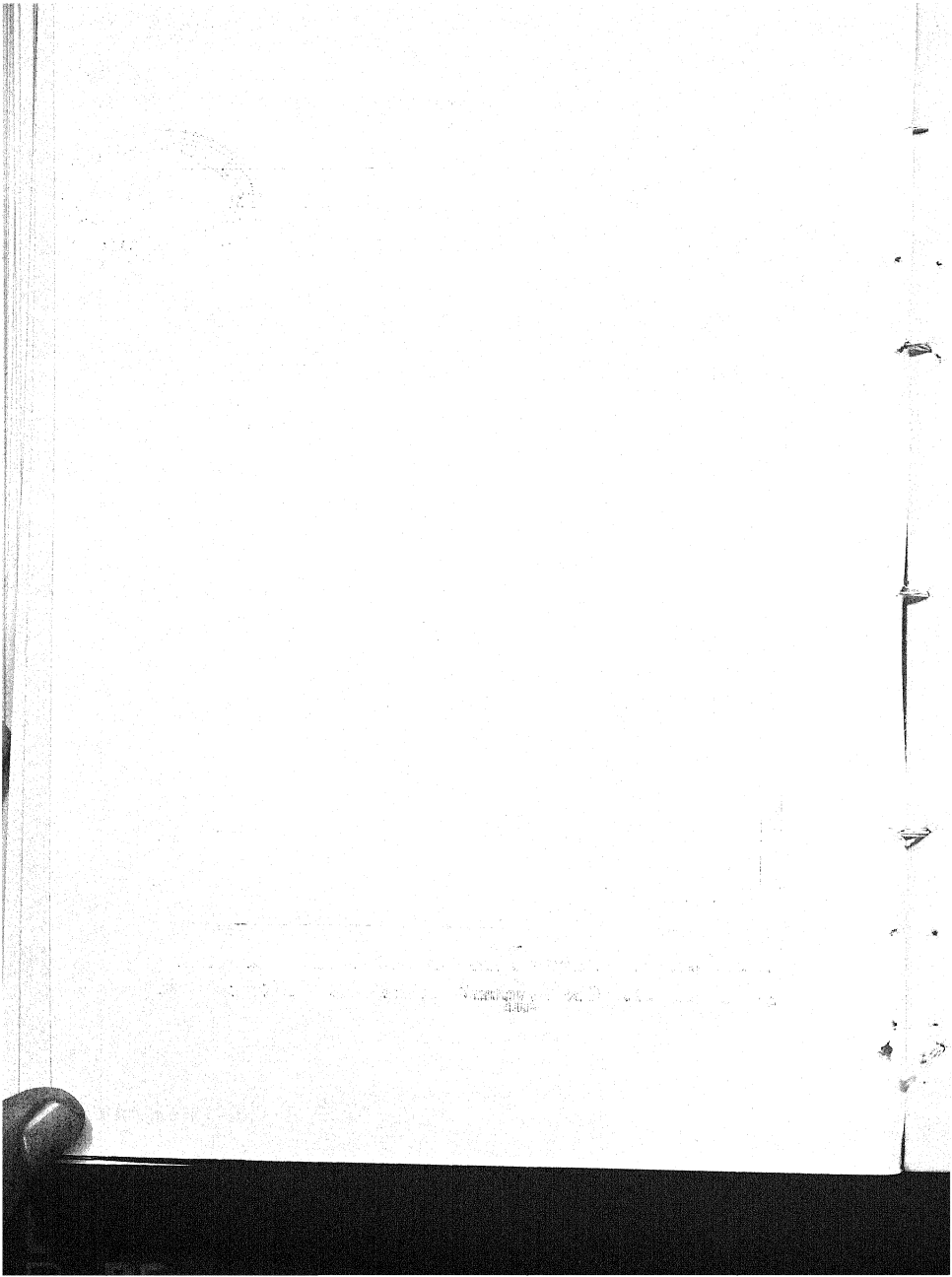
*The writers would like to record their great appreciation of the many helpful suggestions which they have received from Mr. F. C. Cooke and of the keen interest which he has displayed during the course of these experiments.

THE ATTRACTION OF *CARPOPHILUS* SPP.
SILVANUS ADVENA
NECROBIA RUFIPES TO DIFFERENT TYPES OF COPRA & OLEIC ACID.



- 1 FINEST COPRA OLD AND DRY 2 SLIMY & MOULDY COPRA HALF DRY 3 SLIMY COPRA DRIED 4 SLIMY & MOULDY WET COPRA
 5 WHITE COPRA NEW & DRY 6 DRY COPRA WITH GREEN MOULD 7 OLEIC ACID 8 "COPRA" DUST

AC



Record of Catches on	First day			Second day			Third day			Fourth day			Fifth day			Sixth day			Seventh day			Eight day			Ninth day			Total		
	<i>Necrobia</i>	<i>Sitonaus</i>	<i>Carphophilus</i>	<i>Necrobia</i>	<i>Sitonaus</i>	<i>Carphophilus</i>	<i>Necrobia</i>	<i>Sitonaus</i>	<i>Carphophilus</i>	<i>Necrobia</i>	<i>Sitonaus</i>	<i>Carphophilus</i>	<i>Necrobia</i>	<i>Sitonaus</i>	<i>Carphophilus</i>	<i>Necrobia</i>	<i>Sitonaus</i>	<i>Carphophilus</i>	<i>Necrobia</i>	<i>Sitonaus</i>	<i>Carphophilus</i>	<i>Necrobia</i>	<i>Sitonaus</i>	<i>Carphophilus</i>	<i>Necrobia</i>	<i>Sitonaus</i>	<i>Carphophilus</i>	<i>Necrobia</i>	<i>Sitonaus</i>	<i>Carphophilus</i>
1. Estate f.m.s. copra (old and dry) ...	0	3	0	0	3	0	0	17	0	4	37	1	2	6	0	1	32	0	0	31	0	0	25	0	0	21	0	7	175	1
2. Slimy and mouldy copra (half dry) ...	2	91	279	3	43	36	8	59	1	6	123	7	2	21	0	2	56	0	3	15	2	1	49	0	0	26	1	27	483	326
3. Hard copra with dried up slime (dry) ...	24	64	0	14	53	0	10	69	0	8	60	0	0	26	1	4	74	0	2	68	0	0	151	0	1	56	0	63	621	1
4. Slimy and mouldy copra (raw) ...	42	354	972	31	191	753	27	378	129	31	364	89	15	41	6	9	78	4	1	25	3	1	42	4	2	18	0	159	1491	1960
5. White copra, (fresh and dry) ...	4	7	0	4	9	0	2	28	1	2	18	0	3	9	0	1	48	0	3	96	0	0	12	0	0	8	0	19	235	1
6. Copra with green mould (dry) ...	2	32	2	4	91	1	1	84	0	1	138	0	0	84	0	0	30	1	2	28	0	0	33	0	2	13	0	12	533	4
7. Oleic acid ...	8	1217	5	8	447	13	6	681	6	1	334	11	1	325	13	0	264	8	1	167	8	2	119	9	0	87	6	27	3641	79
8. Copra dust ...	0	0	0	0	0	0	0	5	0	0	39	0	0	1	0	0	4	0	0	0	0	0	4	0	0	4	1	0	57	1
	82	1768	1258	64	837	803	54	1321	137	53	1113	108	23	513	20	17	586	13	12	430	13	4	435	13	5	233	8	314	7236	2373

* Classified by Mr. F. C. Cooke.



The number of *Silvanus advena* attracted to oleic acid is remarkable but its fall is not easily explained unless the excretions of insects rendered it less attractive. It may be suggested that, since oleic acid when fresh undoubtedly attracts large numbers of *Silvanus advena*, it should be employed as a control. The fact, however, that *Silvanus advena* is practically entirely mycetophagous (unpublished records), suggests that the employment of this or any control would be of doubtful benefit.

Carpophilus dimidiatus F.

The graphs and figures clearly show that *Carpophilus dimidiatus* prefers wet, actively slimy, and mouldy copra. To the dried copras, whether supporting mould or not, and to oleic acid, this beetle is definitely not attracted.

In addition to the beetles considered above, *Tribolium castaneum* Hbst., *Silvanus surinamensis* L. and *Dermestes vulpinus* F. were occasionally recorded, but neither type of copra nor oleic acid possessed any attraction. Previous work has shown that the presence in Malaya of the two first-mentioned insects in copra is largely due to the use of old rice sacks for the transport of copra.

The Attraction of *Necrobia rufipes* de Geer. to Slimy Wet Copra and to Dried but somewhat Soft Slimy, Copra.

It has been suggested that the apparently greater attraction of dried, slimy copra without moulds than that of half-dry, slimy and mouldy copra may be due to bacterial products being present in greater quantity in the former than in the latter. Accordingly, another experiment was conducted with fresh, wet, slimy copra, and dried, though somewhat soft, slimy copra. *Necrobia* at first was attracted to the fresh, wet, slimy copra, but after a short time left this copra and congregated on the dried, somewhat soft, slimy copra. It is possible that *Necrobia* was attracted to the fresh wet, slimy copra in greater numbers at first on account of the presence of moisture. This has been observed when *Necrobia* has been supplied with fresh coconut meat. In five observations as to the attraction of *Necrobia* to the above types of copra, 12 *Necrobia* were recorded on the wet, slimy copra but 81 *Necrobia* on the dried, somewhat soft, slimy copra. With the development of moulds, however, on the wet, slimy copra, *Necrobia* was again attracted in greater numbers. The wet slimy copra commenced to grow moulds almost immediately and at the observations at different times from the fourth to the eighth day, the number of *Necrobia* recorded on the slimy, wet copra was 172 and on the dry, soft, slimy copra, which commenced to show signs of mould on the eighth day was 176. This result again demonstrates that, with the development of moulds, *Necrobia* is attracted in larger numbers, and indicates that as the decomposition products produced in copra by bacteria and moulds increase, the number of *Necrobia* attracted thereto is enhanced.

Conclusion.

This investigation suggests that measures such as the use of traps and the regular fumigation of copra stocks at the port of export for the control of insects associated with copra would be unnecessary in Malaya, if good quality copra were produced.

Summary.

1 *Necrobia rufipes* de Geer. is attracted most to slimy, wet, mouldy copra and more to slimy, dry than to slimy, wet copra. It shows little attraction towards good dry copra. *Carpophilus dimidiatus* F. (mostly) and *Silvanus advena* Walk. are most attracted to slimy, mouldy copra.

2. *Necrobia* appears to be attracted more to lauric and myristic than to the other fatty acids of coconut oil and to the mixed fatty acids of than to the oils of coconut and palm kernel. *Silvanus advena* is attracted to oleic acid in large numbers but *Necrobia rufipes* is not sufficiently attracted to recommend the employment of the acid as a control for this beetle.

3. It is suggested that *Necrobia rufipes* de Geer. is attracted to the decomposition products in copra as a result of bacterial or fungoid activity.

4. Traps and fumigation are not recommended for the control of insects associated with copra. The production of good copra in Malaya is favoured.

CONDITIONS ON RUBBER SMALL HOLDINGS IN MALAYA.

1st Quarter, 1935.

*Prepared by the Economic Branch of the Department of Agriculture,
S.S. and F.M.S., in collaboration with the Field Branch of the
Department.*

Rainfall.

The first quarter was exceptionally dry, rainfall being below normal in January and February in nearly all parts of the Peninsula, March was a wetter month, but the majority of reports indicate that the rainfall was below average.

Prices.

The market for rubber weakened towards the end of the quarter and prices for small-holders' rubber accordingly fell in sympathy.

The usual tables are given covering several centres in each State. Table I shews the lowest and highest prices at which rubber was purchased and Table II gives the mean of the extremes.

Production.

Table III shews production on small holdings for the quarter under review, and also, for the purpose of comparison, the relative figures for the first quarter, 1934. It will be seen that there was a very considerable fall in production as compared with the previous year, due no doubt, to the operation of rubber regulation. The table is compiled from the monthly report of stocks, production, imports and exports of rubber, published by the Registrar-General of Statistics, Straits Settlements and Federated Malay States.

Tapping.

Tapping was considerably less during the quarter, as is shewn by the fall in production. A variety of reasons for this fact are advanced in reports; the wintering of trees, poorer prices, and lack of coupons were probably the principal reasons for less tapping, while the incidence of padi harvesting in certain districts was a contributory cause.

Areas out of Tapping.

Estimates of areas untapped on small holdings were obtained by counting the number of such areas and applying the percentage thus obtained to the total area of such holdings in the District.

Table I.
Lowest and Highest Rubber Prices Paid by Local Rubber Dealers.
(In Straits dollars per picul (133 1/3 lbs.))

1st Quarter 1935.

	Penang	Perak	Selangor	Negri Sembilan	Pahang	Malacca	Kedah	Johore
Smoked sheet	23.00-28.00	19.00-26.95	JANUARY 21.00-26.00 | 23.00-27.50 22.00-23.00 | 21.00-24.80 12.00-15.00 | 12.00 16.50		21.00-25.80	22.00-25.00	23.50-27.00	22.00-25.75
Unsmoked sheet	22.00-26.50	19.00-23.50			19.00-23.25	21.00-24.00	20.50-23.50	19.00-24.00
Scrap	11.50-16.20	10.00-15.00			10.00-11.00	13.00-16.00	13.00-15.50	1.00-16.00
Smoked sheet	23.50-26.50	21.50-26.60	FEBRUARY 23.00-27.00 | 23.00-26.30 21.00-25.00 | 20.00-24.50 13.00-18.00 | 12.00-17.70		20.00-23.75	21.00-25.00	23.00-26.40	21.00-25.75
Unsmoked sheet	22.50-25.00	19.00-24.00			18.00-23.60	20.00 24.00	20.00-24.00	19.40-27.70
Scrap	9.00-17.00	10.00-15.00			—	13.00-16.00	14.00-16.00	1.00-17.00
Smoked sheet	19.00-27.00	17.00-25.40	MARCH 19.80-24.80 | 20.00-23.20 16.00-24.00 | 16.00-23.00 5.00-13.00 | 13.00-17.00		17.00-24.50	19.00-25.00	22.00-27.70	18.50-25.00
Unsmoked sheet	17.00-25.00	15.50-23.50			17.00-24.20	18.00-22.00	19.00-24.50	16.00-24.00
Scrap	7.00-16.00	10.00-15.00			—	10.00-14.00	7.00-15.00	4.00-18.00

Table II.
Mean of Lowest and Highest Rubber Prices Paid by Local Dealers
at a number of Centres in each State.
(In Straits dollars per picul (133 1/3 lbs.))
1st Quarter 1935.

	Penang	Farak	Selangor	Negri Sembilan	Pahang	Malacca	Kedah	Johore
			JANUARY					
Smoked sheet	24.16-26.83	23.33-24.85	23.50-25.08	23.90-26.60	22.08-24.75	22.33-24.66	23.00-25.66	23.08-24.61
Unsmoked sheet	22.87-25.30	20.65-22.30	22.00-22.87	21.37-24.01	20.00-22.69	21.00-22.66	21.66-23.00	20.84-22.81
Scrap	13.00-14.55	12.16-13.33	12.75-14.50	12.83-15.42	10.00-11.00	13.33-15.00	14.00-14.83	10.47-12.56
			FEBRUARY					
Smoked sheet	24.47-25.83	23.55-24.70	24.05-25.76	23.80-25.86	21.84-24.31	22.33-25.00	24.00-25.80	23.27-24.90
Unsmoked sheet	22.95-24.70	20.88-22.49	22.00-23.66	20.80-23.62	19.75-22.17	21.00-23.00	21.50-22.36	21.25-22.44
Scrap	12.50-15.12	11.66-13.83	14.00-15.55	13.25-16.30	—	13.33-15.33	14.33-15.00	10.17-12.63
			MARCH					
Smoked sheet	20.83-26.00	20.48-23.55	20.66-24.06	20.50-24.55	19.10-23.82	19.33-23.66	23.50-25.33	20.30-22.78
Unsmoked sheet	18.87-24.25	17.82-21.71	17.50-20.68	18.00-21.79	17.75-21.75	18.00-20.66	20.50-22.83	18.41-21.34
Scrap	11.75-14.12	12.00-15.00	9.50-13.00	13.50-16.12	—	11.33-13.00	11.66-13.33	11.37-14.28

Table IV shows the result of the survey in March, and a very big increase is evident in areas out of tapping. The area out of tapping on small holdings at the end of March 1935 was 17.5 per cent. as compared with 7.8 per cent. at the end of December 1934 (93,100 acres as compared with 41,000 acres). In the Straits Settlements the area out of tapping was 15.4 per cent. at the end of March as compared with 9.4 per cent. at the end of December (17,900 acres as compared with 11,600 acres).

For the Federated Malay States and Straits Settlements together, 17 per cent. of the total area of small holdings was out of tapping at the end of March 1935 as compared with 8 per cent. at the end of December 1934. The increase in areas out of tapping is even more considerable if comparison is made with the survey in March, 1934, when estimated figures were 34,950 acres and 9,900 acres in the Federated Malay States and Straits Settlements respectively.

Condition of Holdings.

The improved standard of upkeep of small holdings has been maintained, and efforts have been made to clean up holdings and to carry out the advice given by Malay Agricultural Assistants and Asiatic Rubber Instructors.

"Wintering" was in progress at the beginning of the year but was almost completed by the end of the quarter.

In Perak Central a certain amount of young rubber was brought into tapping in an endeavour to obtain a higher coupon allowance. The areas involved were not large. A small amount of replanting took place in the Dindings. In Johore North also, tapping of immature rubber was commenced; in some cases in the hope of obtaining more coupons, and in others rent falling due at the end of the quarter possibly being the explanation.

Diseases.

Mouldy rot was little in evidence during the first quarter, the dry weather being unfavourable to its development. From Pahang it was reported that an outbreak in Kuantan had been satisfactorily controlled.

From Perak Central, only infrequent cases of pink disease were reported.

Secondary leaf fall, *Oidium Heveae*, was general throughout the Peninsula, but all cases reported were of a slight nature.

An increasing number of trees in the Muar District of Johore were reported as being attacked by boring beetles. Bad tapping is the primary cause, wounds affording an easy entrance to the beetles.

In Rembau, Negri Sembilan, a few small-holders have resorted to treatment by trenching for root disease. This disease still remains in evidence in Perak Central but the small-holder there is slow to take action. Brown Bast was fairly common in most localities in Selangor, and advice regarding treatment was given by the Asiatic Rubber Instructors.

Table III.

Production of Rubber on Small Holdings.
(in tons)

	1st Quarter 1935	1st Quarter 1934	Total for year 1934
Federated Malay States ...	16,786	32,492	104,141
Unfederated Malay States ...	16,021	22,094	81,459
Straits Settlements ...	2,867	7,823	31,403
Total ...	35,624	62,409	217,003

Grades of Rubber.

Particulars are given of the percentages of sales of smoked and unsmoked sheet, and it will be seen that preference for one type or the other would appear to be largely dependent on the custom of the district, although the small-holder is now beginning to realise the advantage under rubber regulation of producing smoked sheet. Sales of scrap were, for the most part, negligible.

Kedah.—There was an increase in the percentage of smoked sheet sold in comparison with the last quarter of 1934, and the following are the average percentages for smoked and unsmoked sheet respectively. North Kedah : 87, 11; Central Kedah : 60, 37; South Kedah : 52, 41.

Johore.—The proportion of smoked and unsmoked rubber remained almost unchanged. Johore North, with the exception of Panchor, favoured smoked sheet, the percentages being Segamat 50, Tangkak 85, Muar 71, Batu Pahat 84. The percentage of unsmoked sheet at Panchor was 98.8, and in Central and South Johore the percentages of this grade were :—Endau 97, Johore Bahru 45, (scrap 25), Kota Tinggi 60 (scrap 15), Pontian 80 (scrap 15).

Perak.—In Krian and Selama there was again no change in the proportion of grades purchased. The percentages were :—Krian : smoked 30, unsmoked 70; Selama : smoked 80, unsmoked 20.

A marked preference was shewn for unsmoked sheet in Perak North and South, the percentage rising to 85 and 73 respectively, as compared with 66 and 63 in the previous quarter.

In Perak Central the percentages for smoked and unsmoked sheet respectively were :—Kuala Kangsar : 66, 34; Lenggong : 18, 82; Lumut : 63, 37.

Table IV.
Estimated Acreage of Tappable Rubber which was out of Tapping on Holdings of less than 100 Acres, at the end of March, 1935.

PERAK				SELANGOR				NEGRI SEMBILAN				PAHANG			
District	Total Tappable area	Total untapped area	Percentage	District	Total Tappable area	Total untapped area	Percentage	District	Total Tappable area	Total untapped area	Percentage	District	Total Tappable area	Total untapped area	Percentage
Batang Padang	37,288	4,100	11	Klang	18,870	4,200	22	Seremban	19,241	11,900	62	Raub	7,561	400	6
Kinta	34,180	3,100	9	Kuala Langat	20,263	3,500	12	Tampin	17,947	4,700	26	Kuala Lipis	15,951	3,000	19
Kuala Kangsar	43,485	6,100	14	Ulu Langat	38,897	6,600	17	Kuala Pilah	17,470	3,700	21	Bentong	13,600	2,100	15
Upper Perak	13,774	1,700	12	Ulu Selangor	30,652	3,400	11	Telebu	6,270	900	15	Other Districts†	31,223	4,600	15
Larut & Selama	51,407	2,600	5	Kuala Lumpur	21,174	3,200	15	Port Dickson	10,653	6,700	63				
Krian	9,751	4,500	46	Kuala Selangor†	9,379	1,400	15								
Lower Perak*	47,937	6,700	14												
Dindings	7,279	4,100	56												
	245,101	32,900	13		148,194	22,300	15		71,581	27,900	39		68,135	10,000	15
MALACCA				PENANG & P. WELLESLEY				SINGAPORE							
District	Total Tappable area	Total untapped area	Percentage	District	Total Tappable area	Total untapped area	Percentage	District	Total Tappable area	Total untapped area	Percentage				
Central	17,687	5,300	30	North	3,241	400	12	Singapore	12,781	600	5				
Alor Gajah	31,387	3,500	11	Central	7,067	1,800	26								
Jasin	24,971	4,700	19	South	8,149	nil	nil								
				Penang	11,114	1,600	14								
	74,045	13,500	18		29,571	3,800	13		12,781	600	5				

The percentage of areas out of tapping in December, 1934, was as follows:—Perak 6, Selangor 18, the Negri Sembilan 7, Pahang 15, Malacca 9, Penang and Province Wellesley 16, Singapore 2.

* Estimated from percentage for Kuala Kangsar.

† Estimated from percentage for other Districts in the State.



Selangor.—In Selangor the production of unsmoked sheet is becoming less and less popular. In the Kuala Langat District, Malay-owned smoke-houses are to be found in practically every small-holding with the result that little or no unsmoked sheet is now produced in this District. Scrap has become almost unsalable.

In the Klang District the percentage of smoked sheet was 81.3, the balance being scrap.

Penang and Province Wellesley.—Sales were almost entirely of smoked sheet with a small percentage of scrap. In one or two districts of Province Wellesley sales of unsmoked sheet reached 50 per cent.

Malacca.—The respective percentages of purchases of smoked and unsmoked sheet were as follows:—Central: 69, 25; Alor Gajah: nil, 94; Jasin: 43, 57.

Negri Sembilan.—There was a marked preference for unsmoked sheet, only this grade being sold at five centres. An average of percentages for the State is: smoked 57, unsmoked 42.

Sale of Coupons.

As usual the sale of coupons without rubber is reported from all parts of the Peninsula and it explains probably to a large extent the big increase in the holdings out of tapping. In Negri Sembilan it is understood that coupons are being sold for \$13 per picul allowance, and many Malay small-holders apparently prefer to sell their rights at this price rather than produce rubber for which they would receive approximately an additional \$10 per picul.

The same procedure was being adopted by Chettiar owners in the Kuala Kangsar District, and it is to the benefit of other small-holders who are thus enabled to dispose of more rubber. In other parts of Perak Central it was reported that small-holders were disposing of their coupons without rubber at a price ranging from 12 cents to 15 cents per kati allowance of rubber, afterwards selling their rubber at the price ruling for uncoupons rubber. It is considered that the small-holder loses slightly on each transaction.

General.

Reports indicate that, generally, the economic position of the small-holder is sounder in spite of a fall in prices. Nevertheless, there has been a tendency for small-holders to attempt alternative crops; in Perak Central there have been considerable acreages of *blukar* and *lalang* grassland re-opened for tobacco cultivation, and in the Dindings and Sitiawan, areas of fruit and food crops for home consumption and for sale at fairs have been reported to have been opened up by persons owning rubber holdings.

Reports from Pahang also indicate that more interest is being shewn in other crops, especially padi cultivation, but that there is no tendency to abandon rubber for alternative cultivation.

From this State it is also reported that in one of the southern districts, dealers are grading rubber into six grades, with a difference of \$1 per picul between each grade. The small-holder thus may lose up to \$6 per picul for poor quality rubber.

From Johore it is reported that at Segamat there is a marked tendency among small-holders owning two or more holdings, to tap heavily only one such holding in order to produce sufficient rubber to meet their coupon allowance. Similarly in Perak South, the Chettiar owners were leaving untapped the smaller unprofitable holdings and devoting their attention to the better holdings.

A slight change in marketing methods was recorded in the Muar District, where Chinese dealers who previously paid cash for rubber bought now make the sellers wait until the rubber has been re-sold in town. The reasons for this change are, (a) the fluctuation in the town prices of rubber, and (b) the remote possibility of the Chinese dealer losing on the transaction. From Johore it is also pointed out that small-holders who leased their holdings before the introduction of rubber regulation are still in bad financial circumstances, and are gradually interesting themselves in padi planting.

Review.

The Diseases and Curing of Cacao.

H. R. Briton-Jones. 143 pages, bibliography and index, illustrated. Macmillan & Co. Ltd., London, 1934. Price 10 shillings.

This book forms an addition to the series of hand-books dealing with the diseases which affect the major tropical crops. The need for such a series was discussed at the Imperial Mycological Conference held in London in 1929, and following this, the author, Dr. H. R. Briton-Jones, Professor of Mycology and Bacteriology at the Imperial College of Tropical Agriculture, Trinidad, was asked to write the handbook on cacao diseases.

A chapter on the curing of cacao has been added with a view to collecting together under one cover the available information on the subject in order to assist agricultural officers and cacao planters to understand the main principles underlying the preparation of cacao.

Although concerned with a crop which is not cultivated in Malaya, the book contains much of local interest since the diseases dealt with are, in the majority of instances, caused by fungi which are responsible for diseases of rubber trees and other crops in Malaya. In fact, the accounts of many of the root and stem diseases of cacao mentioned in the book are based on descriptions, published in literature emanating from the eastern tropics, of the diseases as they occur on the rubber tree.

In addition to the root diseases recorded both on rubber and cacao, two forms of root disease not affecting rubber are described. One of these is caused by species of *Rosellinia*, a fungus recently recorded as the cause of root disease of Arabian coffee and of grape fruit grown at Cameron Highlands. The accounts of diseases caused by *Rosellinia* in the West Indies should be of special interest to planters engaged in the cultivation of these crops in Malaya.

In a section of Chapter I, under the heading Root Disease Control, the question of sources of root infection of the planted crops is discussed. The author considers the whole question of these root diseases from the point of view that the fungi responsible for the diseases are present in the soil beforehand. He recommends the adoption of methods tending to eliminate factors which encourage the attack of these fungi on the host plant rather than efforts to eliminate sources of infection, or attempts to confine a fungus to a limited area by means of isolation trenches, however useful these may be in certain cases. In this connection the benefit of the construction of the drainage system before planting is urged as a measure of prevention, not only on account of the protection afforded by the drains, but also on account of the beneficial effect on the soil. The extension, when necessary, of a portion of a system of isolation trenches to function as drains is also advised. Here of course the drainage requirements of the area should be considered.

On grounds of expense the author considers that the removal of dead trees, and the following up and extraction of diseased roots, is a counsel of perfection which is quite impracticable under normal conditions. While this may be a correct view under certain conditions the matter is one which should surely be determined by local conditions and particular cases. Furthermore, the danger of spore infection, from fructifications formed on diseased trees, which the author considers negligible as far as root disease is concerned, should not be ignored, particularly in connection with spore infection of *aerial* portions of adjoining trees by wound parasites such as *Ustulina zonata* in the case of rubber trees, or infection of crops in adjoining areas subject to a stem disease such as stem-rot (*Fomes noxius*) in oil palms.

In the chapter on stem diseases several pages are devoted to "Diplodia die back". The author's comments on this "disease" and his remarks on spraying as a control measure—a subject again referred to in connection with pod diseases and "witches broom" disease—are welcome. Spraying with a fungicide is undoubtedly a very important control measure in the case of certain diseases of plants, but the application of such a method in tropical plant disease control is limited, and in a large number of cases the initiating cause of a disease is not always the fungus which grows in the tissues of the affected plant but some outside factor such as incorrect agricultural methods, unsuitable environment, or climatic disturbances. Throughout the book the author stresses the importance of combatting disease by attempting to bring about conditions which are within the range of tolerance of the host and outside that of the parasite, a point of view which is now receiving increased attention by present day workers in the field of plant pathology.

The book is well illustrated, but would be improved by the inclusion of coloured plates, especially in the section dealing with pod-diseases.

A. T.

Departmental.

ANNUAL PRIZE DISTRIBUTION AT THE SCHOOL OF AGRICULTURE, SERDANG.

The annual prize distribution at the School of Agriculture took place on 18th April, 1935. In addition to the staff and students there were present the Hon'ble The Director of Agriculture, S.S., and Adviser on Agriculture for the Malay States (Dr. H. A. Tempany, C.B.E.), and the following members of the School Advisory Committee—Lt. Colonel B. J. Eaton, O.B.E., the Hon'ble The Undang of Rembau, C.B.E., M.F.C., and Messrs. Stanton and Swaine.

The Vice-Principal of the School, Mr. G. E. Mann, extended a cordial welcome to Dr. Tempany and the members of the Committee. In reviewing the past year's work, Mr. Mann said :—

"The past year has been one of steady, all-round progress and of increased confidence in the School. The number of students in residence has risen from 53 to 70; and, of these 70, no fewer than 22 are *bona fide* private students. As in the past, tuition fees have been levied in respect of students admitted at the request of Governments other than those of the Straits Settlements and Federated Malay States, and the revenue derived from tuition fees alone in 1934 has risen to more than \$5,000—an increase of \$2,000 over the previous year.

"Forty-seven students are leaving the School today on the conclusion of their respective courses of training. Of these, practically all the Malays have secured employment. Nine of them are earmarked for employment by Government in Selangor, Johore, Brunei and Kelantan; from eight to eleven will enter the Federated Malay States agricultural services, while four are going to the Rubber Research Institute. All six Chinese who are leaving have found employment—three in Government Service in Penang, Johore and Sarawak respectively, and three in private capacities. Only in the case of Indian students has there been any shortage of demand. One of them is going to the Rubber Research Institute, and two have been engaged by estates; but this leaves some six or seven young men for whom we must hope for better prospects in the near future.

"We could have found employment on estates for several more Chinese, had they been available. The demand for Chinese has been more or less evident for some time, judging from the fact that the proportion of students of this nationality has increased considerably during the past two years and is still increasing.

"The Scholarship system is now well established in the School, the Straits Settlements and Federated Malay States between them offering some 18 scholarships each year. I should personally like to see this system extended still further as I am convinced that it provides a sounder method of selecting Government and other employees than to engage young men first and train them afterwards.

"With regard to the training which has actually been given at the School during the past year, I have little to say beyond the fact that it has followed

what is laid down in the curriculum, and that practical work has received all possible prominence. I should, however, like to refer particularly to the question of practical training in poultry husbandry. We have been able to give quite a fair measure of instruction in this subject during the past year, considering the very limited number of birds which we have; and I am hopeful that this side of our work—in which the students take a very keen interest—may be expanded in the near future.

"The School has enjoyed several games fixtures during the year—football, hockey and cricket providing the major bases of rivalry; and, although we have not exactly shone, we have at least done creditably. In any case, the games have all been thoroughly enjoyable, and that is the main thing.

"The School platoon of Volunteers, under Mr. Dawson, has also had quite a good year in spite of the fact that it lost the two trophies which it had won the previous year. It is, however, a good thing for these trophies to circulate, for it makes one realise that they are not to be gained for the mere asking, and so encourages the determination to win them back.

"Special courses for Junior Agricultural Officers and for Penghulus have again been held at the School during vacations. The addition of these courses throws a certain amount of extra work on the staff, but I am glad to say that this work is always willingly performed in the determination that no one shall accuse the School of not working to capacity.

"I have pleasure in acknowledging the good services of my staff during the past year, and would in particular pay tribute to the efficiency of Mr. Craig, who acted for me during my absence on long leave. I would also thank those officers of the Co-operative Societies Department, Rubber Research Institute, and the other branches of the Department of Agriculture for the valuable assistance which they have given the School".

Mr. Mann then called upon Dr. Tempany to distribute the prizes, diplomas and certificates which had been awarded in respect of the various courses of training, at the conclusion of which Dr. Tempany said:

"Today is another milestone in the history of this School, and the occasion is marked not only by the prize distribution but also by our pleasure in having with us the members of the Advisory Committee. This is the first opportunity which they have had since the School began of meeting the whole of the students together. On this occasion, I cast my mind back to the day, four years ago, when the School was opened by Sir John Scott in the middle of a terrific thunder-storm. At that time, many people regarded the School as a doubtful experiment. I was asked, "What are you going to do with the students who pass out?", and the opinion was generally held—even if it was not openly expressed—that the only openings would lie in government service. You have heard today what Mr. Mann has said about the 47 students who are leaving. A number of them are admittedly entering government service, but a fair proportion of them have secured posts in private capacities, and the demand in this respect is increasing.

"It is with considerable satisfaction that I notice the attention now bestowed on the School by the Press. Malaya is conscious of the School's existence and has confidence in the value of the training which it offers. We realise, of course, that it is impossible for the School to create agriculturists, but we can and do turn out better men than those who have had no instruction in agriculture at all.

"Going back to the opening ceremony in 1931, I ventured then to wonder whether that ceremony could be regarded as marking the beginnings of a change in the public outlook on Malayan agriculture and an awakening to the fact that greater attention must be paid to diversified agriculture, particularly the increased production of food-crops. Be it coincidence or not, I think the answer today is in the affirmative in spite of the partial rehabilitation of rubber.

"So far as the School is concerned, success is no longer in doubt. It is filled almost to capacity, and it is even likely that there will have to be a waiting list this coming year. The School has passed through severe vicissitudes. There was a period of nearly a year when its fate hung trembling in the balance, when none of us knew whether it would fall a victim to that most deadly weapon—the blue pencil of the retrenchment enthusiast—before it had had a chance of proving its value. Happily it was spared, an act of clemency for which I am personally convinced that the country will in the long run be devoutly thankful. The School has grown not only in numbers but in its corporate life. We already see the beginnings of tradition, the foundation of permanent social activities, and the conviction that those who have passed through its courses of training are better and more efficient citizens and workers as a result.

"To those of you who have won prizes and have been awarded diplomas and certificates, I offer my congratulations. I would add that there rests on you a responsibility to see that the traditions of the School are worthily maintained. I want you to remember in after life that you are ex-students of Serdang. I say, "Be proud of Serdang, and Serdang will be proud of you".

"In bringing about the considerable measure of success that has been achieved, let us not forget the work of the staff. I know that I am at present styled Principal of the School. But, owing to the growth of the work of my Department as a whole, it is now impossible for me to exercise more than a general degree of supervision and guidance in the administration of the School. The real credit for much of the progress made is due to the Vice-Principal, Mr. Mann, now back again from leave, and to his staff. Mr. Dawson went on leave in February, and we hope that he is having as pleasant a holiday as it was well earned. We welcome to the staff Mr. Choo Kok Leong, the son of a very well known and distinguished member of the Chinese community. His appointment has relieved in a considerable degree the great pressure of over-work to which the staff has of late years had to submit. I should also like

to acknowledge the work of the Malay staff, particularly that of Che Mohamed Noor and the two junior lecturers—one of whom, Che Samsudin, will shortly be going to Malacca where he will be in charge of the new Farm School, which may be regarded as the first child of this School. I also associate myself with the tribute which Mr. Mann has paid to the work of Mr. Craig while the former was on leave.

"To the students who are now leaving us, I offer my best wishes for a successful career. I ask them not to lose touch with us, and to remember that if we can help them after they have left we shall be only too glad to do so. To those who are remaining on, I say that I trust that the coming year's work will mark a further advance on its predecessors. On you devolves the duty of carrying on the traditions of the School and of letting the newcomers see by your example what those traditions are. I wish you all a happy holiday".

Mr. Stanton, in the course of a brief speech, referred to the question of employment of Indian students. He was confident that, as time went on, there would be an increasing demand for ex-students of the School, and he felt that the value of the School in this respect was at present not thoroughly realised by the planting community.

A vote of thanks to Dr. Tempany was proposed by the Hon'ble The Undang of Rembau. This was seconded by Colonel Eaton, who referred to the excellent work which had been done by the nine Asiatic Rubber Instructors who had been recruited from the School a year ago. He looked forward to recruiting five more this year. He advised the students who were leaving to remember that they should always be students: that they should always be observant and careful to record their observations, the value of which would become evident sooner or later.



FROM THE DISTRICTS.

*Compiled by the Chief Field Officer from Monthly Reports submitted
by Field Officers.*

April, 1935.

The Weather.

The weather in April was on the whole normal for the north. On the western side of the Peninsula it was at first hot and dry, but later showery and cooler with an average rainfall. In Larut District of Perak, however, precipitation was well above average, while in Upper Perak and Kinta Districts, the Temerloh District of Pahang, the Jelebu District of Negri Sembilan and the centre and east coast of Johore it was deficient, as it was also in the Kuala Langat District of Selangor and in Singapore Island. On the east coast the dry hot season commenced as usual in April, but while the rainfall was unusually low in Kelantan, it was somewhat above average on the coast of Pahang.

Remarks on Crops.

Rubber. There is little change to record in the general situation, beyond the increase in the percentage of restriction and the issue of export coupons to small-holders for the second quarter of the year. This issue, combined with the recovery of the trees from wintering, tended to increase production in some localities, but in others preparation of the fields for padi planting had the opposite effect. In the Negri Sembilan high tapping became even more prevalent than in the past.

Further instances were recorded of improvement in the quality of the sheet produced on small holdings as a result of the work of the Asiatic Rubber Instructors. In Kelantan the communal use of rollers for the preparation of sheet and the substitution of acid for alum as a coagulant are still spreading, in accordance with the teaching of the Department of Agriculture. In consequence the production of wet and dirty, block rubber is decreasing. It is curious, however, that in this State, peasant proprietors, who will willingly pay \$22 for a pair of rollers, can only with difficulty be persuaded to spend a few cents on a sieve and to abandon the usual substitute consisting of a handful of padi straw in a coconut shell.

The mild, but widespread, outbreak of leaf mildew, *Oidium Heveae*, ran its course, and attacked trees showed marked improvement by the end of the month.

Padi. The padi harvest was practically completed everywhere, except in Larut District of Perak and in the large new areas of Sungei Manik in Lower Perak and Panchang Bedina in Kuala Selangor District. In the former it was in progress during the month; in the latter it is expected to begin in May.

In Kedah the first rough estimate of the crop is between 88 and 99 million gantangs of padi. This is higher than was expected when allowance had been made for the extensive damage done in some areas by floods earlier in the season. It is only about 5 million gantangs below the record crop of the previous season, this satisfactory result being attributed to high yields in the unharmed Kota Star District.

In Province Wellesley South a good yield was obtained, so that the whole crop in the Province and Penang Island has been good. In Kelantan the wet padi harvest has been fairly good.

The work of the new season is in all stages of progress up to transplanting in the inland Districts of Selangor, most parts of Negri Sembilan, the Lipis, Temerloh and Pekan Districts of Pahang and parts of Johore. In the Muar District of the latter State, more attention is being given to this crop, in consequence of which some 1,300 gantangs of padi of suitable pedigree strains have been ordered from Malacca for distribution to planters whose supply of seed is deficient.

The first stage of the All-Malayan Padi Competition continued to meet with good support at five local competitions which took place during the month.

The new Government rice mill at Temerloh was again put into operation early in the month, after a stop of about two weeks for certain alterations. The demand for its products is increasing and supplies of padi are coming forward steadily.

Copra. The price of copra improved somewhat and showed less fluctuation than in March. Consequently, copra-making attracted increasing attention. Approved kilns completed or nearing completion include one in Province Wellesley, two in Kuala Selangor and one at Beserah in Kuantan District of Pahang, while an existing kiln in the Province is being extended.

The inter-District trade in nuts continued, as did the preparation and sale of home-made coconut oil at prices ranging from 14 to 18 cents per bottle. Crops of nuts were still below normal in some parts of the country, especially in Kelantan and southern Pahang and the Muar District of Johore.

Pineapples. In Johore fruit supplies remained inadequate for factory requirements and prices were high. One reconstructed factory commenced operations. In Singapore the main season began during the month and all factories were working. One factory completed the erection of accessory buildings, such as bath rooms, kitchen and room for meals, which make for better hygienic conditions. In Johore the registration of two factories was cancelled by the Registrar under the provisions of the Pineapple Industry Enactment.

Fruit. Local species of mango, known as mempelam, kwini and bachang were fruiting in Johore, Pahang and Province Wellesley; the first two were being exported from the Muar District to Singapore. Durians were also fruiting in eastern Pahang, while other fruits in season were pomeloes, jack fruit and

jambu. Exports of bananas from the Kluang and Batu Pahat Districts of Johore to Singapore were continued. From Negri Sembilan increased planting of bananas and pineapples was reported, but it was also reported that in the neighbourhood of Lenggeng several hundred acres of the two fruits had been abandoned owing to attacks of disease.

Tobacco. In Kedah, Province Wellesley, Malacca and Johore the general range of prices for first quality leaf was between \$30 and \$45 per picul. In Perak, however, the range remained between \$50 and \$80 per picul and in western Pahang between \$50 and \$60 per picul. Second and third quality leaf sold at prices varying from \$15 to \$40 per picul, the higher prices being obtained in Perak.

In Kedah an area of about 30 acres is reported to have been planted during the month, and additional planting is also reported in Penang Island and in Upper Perak District.

At Jerantut in Pahang some 20 acres have been planted by Chinese on land owned by Malays. The Chinese clear the land and plant permanent crops, such as coconuts and fruit trees, along with the tobacco. After two or three seasons of tobacco they hand back the land to the Malay owners, who have thus had it cleared and planted without expenditure of money or labour.

Tapioca. Indications of a decline in tapioca production are provided by the fact that two factories in Kedah had to shut down through lack of supplies of root and that another in Johore had to supplement its supplies with sago stems. A decline in supplies is to be expected, since the existing areas of rubber interplanted with tapioca are becoming mature and the further planting of rubber is prohibited, while the cultivation of tapioca as a sole crop is very limited in extent at present, even when allowance is made for its use in rotation with vegetables on several hundred acres of Chinese market gardens.

Agricultural Stations and Padi Test Plots.

At the new Telok Datoh Agricultural Station in Kuala Langat District the second digging of lalang was nearly completed and some old fruit trees were removed. At the Raub Agricultural Station the drainage system was completed and clearing, stumping and levelling were in progress.

The harvest was nearly finished at the Sungei Blat Padi Station in Kuantan District. In spite of somewhat adverse conditions during the season, Siam 29 yielded 430 gantangs and Nachin 66 gave 410 gantangs per acre. These satisfactory yields promise well for the future of the surrounding padi area when once it has been evenly and fully planted.

The establishment of new Padi Test Stations at Sala Kanan in Kedah, in Kuala Pilah District of Negri Sembilan, in Luit mukim of Pekan District, Pahang, and at Jementah and Mersing in Johore was commenced.

Preparation of the land and sowing of nurseries was begun at the Kajang and Kuang Test Plots in Selangor, Kendong Plot in Negri Sembilan and the Temerloh and Pekan Plots in Pahang. At the Jelebu Plot in Negri Sembilan transplanting was in progress.

At Bukit Merah Padi Test Station in Province Wellesley a trial is again being made with the cultivation of certain vegetables during the fallow season. The ridges were prepared and planted during the month.

In accordance with the arrangement made in Krian for encouraging the planting over extensive areas of two or three of the best selected strains, some 3,100 gantangs of seed were distributed locally. There has again been a heavy demand for seed of pure strains from the Pulau Gadong Station in Malacca and supplies, owing to a poor harvest, will unfortunately again be deficient.

Holiday Course for School Boys.

A short holiday course in agriculture for school boys at the High School, Bukit Mertajam, was held at the neighbouring Agricultural Station during the month and was attended by 30 boys, a few of whom bicycled 10 miles daily to attend. It proved most successful.

Rural Lecture Caravan.

The Caravan continued its tour in Larut and Matang Districts during the first half of the month and, after an interval of 9 days for the period of bright moonlight when films cannot be shown out-of-doors, concluded its tour on April 23rd and commenced a tour in Krian on April 25th. During the moonlight period the exhibits only were taken for day tours to outlying places inaccessible to the caravan. This innovation gave encouraging results and the whole tour was successful.

Lecture to School Teachers.

The State Agricultural Officer gave a short lecture on School Gardens to some 70 Malay School teachers from the State who were attending a teachers' conference in Kuala Lumpur on April 19th.

Agricultural Shows.

A successful Agricultural Show for Lower Perak District was held at Telok Anson on April 27th and 28th and a combined District Padi Competition and Agricultural Show was held at Muar in Johore on April 5th. At the latter, classes were provided for padi, fruit, vegetables, cereals and village industries. There were only 50 entries for the Padi Competition and exhibits were not of outstanding merit. Exhibits in the fruit and vegetable sections were on the whole poor, because the fruits were out of season and weather during the past month or two had been too dry for successful vegetable growing.

Poultry.

There was an outbreak of disease at Kuala Selama in Perak which resulted in the death of some 80 birds. This was investigated by an officer of the Veterinary Department. The outbreak at Tras terminated without further loss.

Interest in poultry keeping was well maintained. As a result of lectures and demonstrations in the Perak South Circle, given by the Malay Agricultural Assistants, some 12 improved houses were under construction during the month.

At Kuala Jempol in Negri Sembilan ten Malays have subscribed capital to start a jointly owned poultry farm. Preparation of the ground and erection of houses were in progress.

The flock maintained by the Head Teacher at Batu Yon School in Pahang progressed well.

LOWER PERAK AGRICULTURAL SHOW.

The Lower Perak branch of the Malayan Agri-Horticultural Association held an Agricultural Show at Teluk Anson on the 27th and 28th April, 1935.

H.H. the Sultan of Perak declared the Show open. Among those present were the Hon'ble the Raja Muda of Perak, c.m.g., The Hon'ble the British Resident, Perak, and the District Officer, Lower Perak.

The Show combined the District Padi Competition, for which entries were fewer than last year, although the quality shewed improvement.

Classes were provided for copra, smoked rubber, fruit, vegetables and poultry.

Special exhibits of an educational nature were staged by the Department of Agriculture, the Drainage and Irrigation Department, the Health Department and the Sultan Idris Training College.

DEPARTMENTAL NOTES.

Visits of the Adviser on Agriculture.

The Adviser on Agriculture visited the Panchang Bedina rice area in Kuala Selangor on April 10th in company with the Adviser on Drainage and Irrigation, the Senior Drainage and Irrigation Engineer and the State Agricultural Officer. He traversed the newly opened padi area and inspected the various operations in progress. On April 19th and 20th he inspected the Government Dairy Farm at Fraser's Hill.

On April 25th the Adviser inspected the Coconut Station at Klang; he subsequently visited Mr. Goh Hock Huat's pineapple factory at Klang, and afterwards made a short tour in the Klang and Ulu Selangor Districts, visiting the site for the new Agricultural Station at Morib and inspecting the Agricultural Station at Cheras.

Meeting of the Agricultural Advisory Committee.

A meeting of the Agricultural Advisory Committee was held at the Department of Agriculture, Kuala Lumpur, on 16th April, 1935. Many aspects of the more important agricultural industries were discussed and the progress of the scientific and field work of the Department in relation to these crops examined. An abstract of the minutes of the meeting will be included in the next number of this Journal.

Advisory Committee, School of Agriculture.

A meeting of the Advisory Committee of the School of Agriculture was held at the School on 18th April, 1935. Various routine matters were discussed and agreed upon and the Vice-Principal's Report for 1934 adopted.

Arrangements have been made whereby selected students from the School may be admitted to the Imperial College of Tropical Agriculture, Trinidad, for a further course of training.

An innovation in the training at the School is that, from the beginning of the next school year, a number of Malay and non-Tamil-speaking students will be given some training in colloquial Tamil through the medium of evening classes. The matter is purely experimental, and is primarily designed to remove the objection that Malays are unfit for employment on estates as they usually cannot speak Tamil.

The meeting was informed that 47 students out of 69 are leaving immediately, on the conclusion of their respective courses of training, and that 46 places have already been reserved for incoming students. It is anticipated that the proportion of Malays in residence will be about 50 per cent. and Chinese 40 per cent.

Leave.

Major C. D. V. Georgi, O.B.E., Acting Agricultural Chemist, returned from leave on 11th April, 1935.

Mr. J. W. Jolly, Agricultural Officer, returned from leave on 13th March, 1935.

Statistical.

MARKET PRICES.

April, 1935.

Rubber.—There were only slight fluctuations in the price of rubber during April, opening and closing prices in Singapore being 19 and 19½ cents per lb. respectively. The Singapore average for the month for No. 1. X. Rubber Smoked Sheet was 18.91 cents per lb. as compared with 19.49 cents per lb. in March. The average price in London for the month was 5.70 pence per lb. and in New York 11.47 cents gold per lb. as compared with 5.76 pence and 11.42 cents gold in March.

Prices paid for small-holders' rubber at three centres during the month are shewn in the following table.

Table I.
Weekly Prices Paid By Local Dealers for
Small-Holders' Rubber, April, 1935.

(Dollars per Picul.)

Grades.	Kuala Pilah, Negri Sembilan.				Kuala Kangsar, Perak.				Batu Pahat, Johore.		
	4	11	18	25	3	10	17	24	10	17	24
Smoked sheet		21.73	22.57	22.66	22.65	20.66	22.29	22.04	20.49	20.37	21.70
Unsmoked sheet	20.96	20.40	21.37	21.13	17.20	18.26	19.84	20.00	16.67	18.00	
Scrap							14.00				

Transport by lorry Kuala Pilah to Seremban 15 cents per picul, to Malacca excluding duty, 25 cents per picul, by rail Seremban to Penang \$1.24 per picul, Seremban to Singapore \$3.00 per ton.

Transport from Batu Pahat to Singapore by lorry excluding duty, 90 cents per picul.

Transport from Kuala Kangsar to Prai by railway \$6.20 per ton.

Transport from Kuala Kangsar to Singapore by railway \$10.00 per ton (minimum consignment 5 tons).

At Kuala Pilah the standard deduction for moisture in unsmoked sheet is 5 per cent.

At Kuala Kangsar the standard deduction for moisture in unsmoked sheet is 10 per cent.

No purchases at Batu Pahat on the 3rd April 1935.

Palm Oil. There was a further fall in this market, but palm kernels improved slightly. The following table gives quotations for the Malayan commodities.

Table II.
Prices of Palm Oil and Palm Kernels.

Date 1935.	Palm Oil in Bulk, c.i.f. landed weight Liverpool/ Halifax.	Palm Kernels, c.i.f. landed weight London/ Continent
April 5	per ton £ 19. 10. 0	per ton £ 8. 5. 0
„ 12	20. 10. 0	8. 10. 0
„ 19	20. 0. 0	8. 10. 0
„ 26	20. 0. 0	8. 15. 0

Copra.—There was an improvement in the Singapore market for copra during April and prices rose steadily in the second half of the month. The sun-dried grade opened at \$4.45 per picul and closed at \$4.85, the average for the month being \$4.57 per picul as compared with \$4.44 in March. The mixed quality remained consistently 25 cents per picul lower than the better grade, averaging \$4.32 per picul. The March average was \$4.19 per picul.

Copra cake was quoted throughout the month at \$1.15 per picul; the March average price was \$1.43 per picul.

Rice.—The average wholesale prices of rice per picul in Singapore during March were as follows:—Siam No. 2 (ordinary) \$3.77, Rangoon No. 1 \$3.43, Saigon No. 1 \$3.55, as compared with \$3.37, \$3.16 and \$3.32 in February. Corresponding prices in March 1934 were \$2.82, \$2.47 and \$2.62.

The average retail market prices in cents per gantang of No. 2 Siam rice in March were:—Singapore 27, Penang 20, Malacca 24, as compared with 23, 20 and 22 respectively in February.

Padi.—The Government Rice Mill, Bagan Serai, paid \$1.80 per picul for padi during April. Prices per gantang ranged from 4½ to 13 cents in different parts of the country.

Tea.—Arrangements have now been made to obtain London market prices by air mail, and accordingly this month average prices for both March and April are given.

Several consignments of Malayan tea were sold in London during the months under review. A consignment of Kedah tea was sold at 9½d. per lb. in March and three consignments were sold at an average price of 9.83d. per lb. in April. Two consignments of Boh Plantations tea were sold in March at an average price of 10½d. per lb. and one consignment in April averaged 11d. per lb.

Average London prices per lb. paid during March and April respectively for tea consignments from other countries were as follows:—Ceylon 1s. 3.81d. and 1s. 4.17d., Java 9.40d. and 9.66d.; Indian Northern 11.35d. and 11.39d.; Indian Southern 1s. 0.88d. and 1s. 1.92d.; Sumatra 8.43d. and 8.91d.

The following are the latest Colombo average prices available and are quoted from the *Weekly Tea Market Report*, 30th April, 1935, of the Colombo Brokers' Association; prices are in rupee cents per lb.: High Grown Teas 67 cents, Medium Grown Teas 59 cents, Low Grown Teas 54 cents.

Tuba Root. (*Derris*).—Supplies of good quality roots sold on a basis of rotenone content were scarce and the price in Singapore advanced in April, averaging \$50 per picul as compared with \$46 per picul in March. There were good sales of roots sold on a basis of ether extract, the average price for the month being \$40 per picul, an increase of \$2 per picul as compared with the previous month. Non-Malayan roots averaged \$32 per picul, an increase of \$2 per picul.

Coffee.—There was a further fall in prices of coffee in Singapore in April. Sourabaya coffee opened at \$17 to \$18 per picul, but fell away to \$16 to \$17 per picul at the close. Palembang coffee averaged \$11.19 per picul as compared with \$12.25 in March.

Local prices for coffee remained low in April, ranging from \$22 to \$28 per picul according to quality.

Arecanuts.—Prices continued to weaken during April, Singapore average prices per picul were:—Splits \$4.12 to \$5.55, Sliced \$6.12 to \$8.25, Red Whole \$5.44 to \$6.31, Kelantan \$5.72, the price in each range depending upon quality.

The average prices per picul quoted by the Singapore Chamber of Commerce were:—Best \$6.04, Medium \$5.55, Mixed \$5.07.

Gambier.—The price of Block in Singapore during April remained unchanged at \$5 per picul as compared with an average of \$5.05 per picul in March. No. 1 Cube improved, the price being \$11 per picul throughout the month as compared with the previous month's average of \$10.70.

Pineapples.—Prices in Singapore per case have now been fixed by the Packers' Combine as follows:—Cubes \$3.25, Sliced Flat \$3.15, Sliced Tail \$3.35. The March average prices were:—\$3.19, \$3.08 and \$3.23 respectively.

Fresh fruit prices per 100 were:—Singapore, \$2.50 and \$1.50 for large and small sizes respectively; Johore, 1st quality \$1.80 to \$2.20, 2nd quality \$1.50 to \$1.80, 3rd quality \$1 to \$1.20. Selangor, 70 cents to \$1.50 according to quality.

Tapioca.—Prices per picul in Singapore for April remained unchanged at the March closing levels. They were : Flake Fair \$4; Seed Pearl \$5.40; Medium Pearl \$6 as compared with \$4, \$5.42 and \$6 in March.

Sago.—Pearl, Small Fair improved slightly in April to average \$3.74 per picul as against \$3.67 in March, while Flour, Sarawak Fair weakened to average \$2.30 per picul as compared with \$2.42 in March.

Mace.—Prices in Singapore were lower during April. Siouw averaged \$98.75 and Amboina \$58.50 per picul as compared with \$105 and \$61.20 respectively in March.

Nutmegs.—Prices in Singapore weakened slightly at the close of April, but the averages for the month were higher in comparison with March. They were : 110's \$27.50 per picul; 80's \$28.50 per picul as against \$27.20 and \$28.20 respectively in the previous month.

Pepper. The market for White continued almost a nominal one, but Black was in fair demand. Average April Singapore prices per picul were :—Singapore Black \$13.75, Singapore White \$26.50, Muntok White \$27.50 as compared with \$14, \$32.40 and \$33.40 respectively in the previous month.

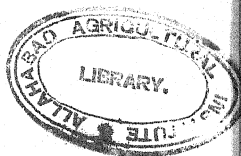
Cloves.—Prices in Singapore remained nominal, but Amboina was further marked down to \$36, averaging \$37.50 per picul, as against \$40.80 in March. Zanzibar was unchanged at \$35 per picul.

Tobacco.—Local prices again varied considerably in different parts of the country. In Johore prices were from \$15 to \$50 per picul, Java tobacco being from \$40 to \$90 per picul. In Perak prices ranged from \$18 to \$82 per picul according to quality.

The above prices are based on London and Singapore daily quotations for rubber; on the Singapore Chamber of Commerce Weekly Reports for the month and on other local sources of information. Palm oil reports are kindly supplied by Messrs. Guthrie & Co. Ltd., Kuala Lumpur; the Singapore prices for coffee and arecanuts by the Lianqui Trading Company of Singapore, and tuba prices by Messrs. Mackay & Co., Singapore.

1 picul = 133½ lbs. The Dollar is fixed at two shillings and four pence.

Note.—The Department of Agriculture will be pleased to assist planters in finding a market for agricultural produce. Similar assistance is also offered by the Malayan Information Agency, 57, Charing Cross, London, S.W.1.



GENERAL RICE SUMMARY*

March, 1935.

Malaya.—Imports of foreign rice into Malaya in March were 55,905 tons, and exports 14,357 tons; net imports accordingly were 41,548 tons. Net imports for the first quarter of 1935 were 113,041 tons, an increase of 3.5 per cent. when compared with the previous year.†

Of the imports during March, 57 per cent. were consigned to Singapore, 20 per cent. to Penang, 5 per cent. to Malacca, 15 per cent. to the Federated Malay States and 3 per cent. to the Unfederated Malay States. Of the total, 57 per cent. came from Siam, 37 per cent. from Burma, 5 per cent. from French Indo-China and 1 per cent. from other countries.

Of the March exports, 72 per cent. were consigned to the Netherlands Indies and 28 per cent. to other countries. The various kinds of rice exported were as follows: Siam 9,828 tons, (68.5 per cent.), Burma 3,417 tons (23.8 per cent.), French Indo-China 521 tons (3.6 per cent.), parboiled 495 tons (3.4 per cent.), local production 96 tons (0.7 per cent.).

India and Burma. Foreign exports in January and February totalled 296,000 tons, an increase of 48.7 per cent. as compared with 199,000 tons in 1934. Of these exports 3.4 per cent. were to the United Kingdom, 5.8 per cent. to the Continent, 26 per cent. to Ceylon, 39.5 per cent. to the Straits Settlements and the Far East, and 25.3 per cent. to other countries. The 1934 percentages were 12.1, 8, 36.2, 21.6, and 22.1 respectively.

Burma's total exports of rice and bran (*Bangkok Times*, 8th April, 1935) from 1st January to 2nd March 1935 totalled 705,750 metric tons, as compared with 528,728 metric tons in 1934, an increase of 33.5 per cent.

Siam.—No further information is available since the February Summary.

Japan.—According to the *Trans-Pacific Journal*, 21st March 1935, rice stocks in Japan proper on March 1, amounted to 6,519,920 tons, a decrease of about 14 per cent. as compared with 1934.

The supply and demand for the period 1st March to 31st October, 1935, are estimated as follows:—

<i>Supply</i> : Rice stocks, 1 March	...	6,519,920 tons
Imports	...	1,129,032 "
<i>Demand</i> : Estimated consumption	...	6,099,579 "
Estimated exports	...	42,076 "
showing a surplus of 1,507,297 tons.		

French Indo-China.—Entries of padi into Cholon during the period 1st January to 31st March, 1935, totalled 586,517 metric tons, an increase of 80.1 per cent. as compared with 1934; exports of rice were 580,351 metric tons, an increase of 70 per cent.

The Netherlands Indies.—No further information is available since the February Summary.

* Abridged from the Rice Summary for March 1935, compiled by the Department of Statistics, Straits Settlements and Federated Malay States.

† It is to be understood throughout the summary that all comparisons and percentage increases or decreases are in relation to the corresponding period of 1934.

Ceylon.—Imports during the first quarter of 1935 were 133,715 tons, an increase of 9.2 per cent. as compared with 1934. Of this year's imports 10.5 per cent. were from British India, 73 per cent. from Burma, 1.3 per cent. from the Straits Settlements and 15.2 per cent. from other countries. The corresponding percentages for 1934 were 15.4, 67.7, 0.1, and 16.8 per cent.

Europe and America.—Shipments to Europe from the East for the period 1st January to 21st March, 1935, were 147,864 tons, a decrease of 13.2 per cent. as compared with 1934.

Of the 1935 shipments 37 per cent. were from Burma, 47.8 per cent. from Saigon, 13.1 per cent. from Siam and 2.1 per cent. from Bengal. The 1934 percentages were 25.3, 53.1, 16.3 and 5.3 respectively.

Shipments from the East to the Levant for the period 1st January to 2nd March 1935 were 12,312 tons, as compared with 5,327 tons in 1934.

Shipments to the West Indies and America for the same period in 1935 were 34,751 tons as compared with 11,852 tons in 1934.

Correction.

Malayan Production of Palm Oil and Kernels 1934.

Vol. XXII, August 1934, page 398.

Palm oil, Johore, should read: April 307.5,

May 444.0, June 543.0. Total 1,294.5 tons.

Palm kernels, F.M.S., should read: April 169.5.

May 154.1, June 116.6. Total 440.2 tons.

Vol. XXII, November 1934, page 577.

Palm kernels, Johore. Total should read: 254.8 tons.

Vol. XXIII, February 1935, page 104.

Palm oil, F.M.S. Total should read: 12,965 tons.

MALAYAN AGRICULTURAL EXPORTS, MARCH, 1935.

PRODUCT.	Net Export in Tons.				
	Year 1934.	Jan.-Mar. 1934.	Jan.-Mar. 1935.	March 1934.	March 1935.
Arecanuts ...	18,882	9,749	6,813	2,035	3,189
Coconuts, fresh † ...	100,826†	21,652†	22,825†	7,108†	8,080†
Coconut oil ...	25,485	6,251	7,271	2,384	2,706
Copra ...	95,618	27,499	30,366	10,445	7,276
Gambier, all kinds ...	2,170	559	672	231	250
Oil cakes ...	11,273	3,161	2,235	764	265
Palm kernels ...	3,196	497	825	151	460
Palm oil ...	15,852	2,244	4,423	580	1,247
Pineapples canned ...	66,633	14,289	14,874	5,457	5,250
Rubber ¶ ...	479,371¶	124,161¶	96,788¶	40,751¶	29,658¶
Sago,—flour ...	10,503	3,469	3,726	2,381	1,020
„ —pearl ...	6,177	766	1,110	291	321
„ —raw ...	7,079*	1,080*	1,723*	312*	583*
Tapioca,—flake ...	5,761	2,172	504	993	108
„ —flour ...	1,842*	532*	335*	319*	220*
„ —pearl ...	15,770	3,775	2,994	1,442	983
Tuba root ...	481	150½	133½	44	3*

† hundreds in number.

* net imports.

¶ production.

MALAYAN PRODUCTION IN TONS OF PALM OIL AND KERNELS
1st Quarter, 1935.

(As declared by Estates)

Month.	Palm Oil		Palm Kernels	
	F.M.S.	U.M.S.	F.M.S.	U.M.S.
January 1935 ...	1,062.3	339.3	174.0	49.6
February „ ...	977.4	220.9	161.7	38.5
March „ ...	1,104.3	334.2	172.6	48.6
Total ...	3,144.0	894.4	508.3	136.7
January 1934 ...	926.0	166.3	152.9	30.8
February „ ...	849.7	129.9	131.6	27.3
March „ ...	1,046.1	220.6	183.0	42.7
Total ...	2,821.8	516.8	467.5	100.8
Total for year 1934 ...	12,965	4,510	2,013	795

MALAYA RUBBER STATISTICS

ACREAGES OF TAPABLE RUBBER NOT TAPPED ON ESTATES OF 100 ACRES AND OVER, FOR THE MONTH ENDING 31st MARCH, 1935.

STATE OR TERRITORY	ACREAGE OF TAPABLE RUBBER end 1933 (d)	ESTATES WHICH HAVE ENTIRELY CEASED TAPPING		ESTATES WHICH HAVE PARTLY CEASED TAPPING (g)		AREA OF TAPABLE RUBBER NEVER BEEN TAPPED		Total (3) + (5)	Percentage of (9) to (2)
		ACREAGE (3)	PERCENTAGE OF (3) TO (2) (4)	ACREAGE (5)	PERCENTAGE OF (5) TO (2) (6)	ACREAGE (7)	PERCENTAGE OF (7) TO (2) (8)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
STRAITS SETTLEMENTS:—									
Province Wellesley	44,285	631	1.4	9,233	20.8	838	1.9	9,864	22.3
Malacca	121,152	356	0.3	17,599	14.5	3,407	2.8	17,955	14.8
Penang Island	1,366	184	14.2	236	17.3	145	10.6	17,430	12.8
Singapore Island	28,842	2,989	10.4	6,719	23.3	829	2.9	9,708	33.7
Total S.S.	195,645	4,170	2.1	33,787	17.3	5,219	2.7	37,957	19.4
FEDERATED MALAY STATES:—									
Perak	260,595	5,071	1.9	48,528	16.7	15,494	5.9	48,599	18.6
Selangor	31,003	8,748	2.8	47,547	15.3	15,560	4.9	50,295	16.2
N. Sembilan	233,592	9,747	4.2	38,732	16.6	15,600	6.7	48,479	20.8
Pahang	46,712	4,715	10.1	17,649	37.8	10,904	23.3	22,364	47.9
Total F.M.S.	830,902	28,281	3.3	147,456	17.3	56,559	6.6	175,737	20.7
UNFEDERATED MALAY STATES:—									
Kedah	365,400	10,220	2.8	28,353	7.8	18,709	5.1	38,573	10.6
Kelantan	126,589	1,798	1.4	28,886	22.8	19,591	15.5	30,684	24.2
Kelantan	25,793	5,962	23.1	933	3.6	5,962	23.1	6,895	26.7
Trengganu	4,543	Nil	Nil	53	1.2	53	1.2	53	1.2
Perlis	1,181	Nil	Nil	543	46.0	Nil	Nil	543	46.0
Brunei	(d) 4,991	Nil	Nil	1,496	30.0	874	17.5	1,496	30.0
Total U.M.S.	528,496	17,980	3.4	60,264	11.4	45,189	8.6	78,244	14.8
TOTAL MALAYA	1,575,043	50,431	3.2	241,507	15.3	106,967	6.8	291,938	18.5

Notes:—(a) Area out of tapping on Estates which have partly ceased tapping refers to areas definitely being rested and excludes areas on any tapping round.

(b) Registered Companies only.

(c) Rentered quarterly.

(d) Figures are as reported by estate managers.

MALAYA RUBBER STATISTICS
TABLE I
STOCKS, PRODUCTION, IMPORTS AND EXPORTS OF RUBBER, INCLUDING LATEX, CONCENTRATED LATEX AND REVEREX,
FOR THE MONTH OF MARCH, 1935 IN DRY TONS.

State Territory 1	Stocks at beginning of month		Production by Estates of 100 acres and over		Imports		Exports including re-exports		Stocks at end of month		Consumption during month
	Ports	Dealers	during the month	during the month	Foreign	From Malay States	Foreign	Local	Ports	Dealers	
MALAY STATES:—											
Penang	2	3	4	5	6	7	8	9	10	11	12
Malacca
Perlis
Kelantan
Trengganu
Brunei
Total Malay States
S. SETTLEMENTS:—											
Malacca
Province Wellesley
Penang
Singapore
Labuan
Total Straits Settlements
TOTAL MALAYA

Figures for the Findings in columns 3 to 8 are included under F.M.S. with effect from 1st January, 1935.

TABLE II
DEALERS' STOCKS, IN DRY TONS

Class of Rubber	Federated States		S'ore		Penang		Province Wellesley		Johore		Kedah	
	22	23	24	25	26	27	28	29	30	31	32	33
DRY RUBBER	9,438	31,298	10,709	3,962	1,389	155						
WET RUBBER	858	2,556	1,453	169	630	82						
TOTAL	10,439	33,884	12,162	4,131	2,019	237						

Notes:—

1. Stocks on estates of less than 100 acres and stocks in transit on rail, road or local steamers not ascertained.
2. The production of estates of less than 100 acres is included in the production of estates of 100 acres and over.
3. Dealers' stocks in the Federated Malay States are reduced to dry weights by the following fixed ratios: unsmoked sheet, 15% wet sheet, 25% scrap, lump, etc., 40%; stocks elsewhere, 25%.
4. Column (33) and (32) represent exports of rubber subject to regulation which, for Singapore and Penang Islands are represented by sales or exports as shown by census paid.
5. The above figures contain certain omissions, is the Report published by the Registrar-General of Statistics, S.S. and F.M.S., at Singapore on 26 April, 1935.

TABLE III
FOREIGN EXPORTS

PORTS	For		January to March 1935
	month	to March 1934	
29	20	31	
Singapore	20,884	105,122	
Penang	...	33,985	
Port Swettenham	11,171	14,451	
Malacca	5,050	959	
MALAYA	272	154,317	
...	47,407		

TABLE IV
DOMESTIC EXPORTS

DOMESTIC EXPORTS		
AREA	For month	January to March
32	33	34
Malay States	27,247	87,531
Straits Settlements	2,699	
MALAYA	30,046	

METEOROLOGICAL SUMMARY, MALAYA, MARCH, 1935.

LOCALITY.	AIR TEMPERATURE IN DEGREES FAHRENHEIT					EARTH TEMPERATURE		RAINFALL						BRIGHT SUNSHINE.			
	Means of			Absolute Extremes			At 1 foot	At 4 feet	Total.	Most in a day.	Number of days.				Total.	Daily Mean.	
	Max.	Min.	A and B.	Highest.	Lowest.	Highest Min.					Lowest Max.	Precipitation, in or more	Thunder storm	Fog morning obs.			Gale force 8 or more
							°F	°F	°F	°F					°F	°F		in.	mm.	Hrs.	Per cent.
Railway Hill, Kuala Lumpur, Selangor	92.6	72.6	82.6	95	70	88	74	85.7	85.6	15	13	4	3	219.25	7.07	58	
Bukit Jeram, Selangor	89.3	73.0	81.1	91	71	85	75	86.3	86.7	2.60	66.1	0.91	16	11	236.15	7.62	63
Sitiawan, Perak	89.8	73.8	81.8	92	72	87	75	84.8	85.2	4.83	122.7	0.77	19	16	225.55	7.28	61
Temerloh, Pahang	89.7	72.6	81.1	94	70	79	74	85.2	85.5	6.09	154.7	1.75	15	12	201.95	6.51	54
Kuala Lipis, Pahang	89.0	71.3	80.1	92	70	76	73	83.4	83.8	7.59	192.8	2.11	18	13	195.10	6.29	52
Kuala Pahang, Pahang	85.4	75.4	80.4	88	73	80	79	84.3	84.7	14.82	376.4	3.98	20	15	199.00	6.42	53
Kallang Aerodrome, S'pore	87.7	75.7	81.7	91	74	77	77	81.8	82.9	8.10	205.7	3.12	14	11	189.60	6.12	51
Butterworth, Province Wellesley	89.7	74.3	82.0	94	72	86	77	86.0	85.7	5.76	146.3	3.32	14	10	254.20	8.20	68
Bayan Lepas Aerodrome, Penang	89.4	74.3	81.9	93	71	86	80	85.7	86.5	4.25	108.0	1.63	12	8	251.55	8.11	68
Bukit China, Malacca	87.5	73.7	80.6	91	70	83	76	84.7	84.4	3.38	85.9	1.41	10	9	224.00	7.23	60
Kluang, Johore	89.6	71.6	80.6	94	69	80	73	82.3	82.1	7.14	181.4	1.62	19	18	191.85	6.19	51
Bukit Lahang, Mersing, Johore	85.0	72.9	78.9	88	70	79	77	81.5	80.5	5.95	151.1	2.03	19	15	203.75	6.57	54
Alor Star, Kedah	91.6	72.4	82.0	96	68	87	75	85.1	84.8	5.39	136.9	1.39	11	11	266.10	8.58	71
Kota Bharu, Kelantan	88.2	72.5	80.3	91	69	81	75	82.9	83.0	1.90	46.3	0.59	8	7	238.40	7.69	64
Kuala Trengganu, Trengganu	86.2	72.7	79.5	89	71	76	76	82.4	82.9	12.23	310.7	5.45	13	12	229.50	7.40	61
HILL STATIONS.																	
Fraser's Hill, Pahang 4268 ft.	74.0	62.3	68.1	78	60	67	64	72.9	72.6	10.66	270.8	1.79	20	17	175.35	5.66	47
Cameron Highlands, Tanah Rata, Pahang 4750 ft.	74.5	56.0	65.3	79	46	70	61	70.1	69.4	6.85	174.0	1.15	16	14	149.30	4.82	40
Cameron Highlands, Rhododendron Hill, Pahang 5120 ft.	73.5	59.5	66.5	78	57	68	62	68.7	68.7	6.87	174.5	1.39	17	14	156.35	5.04	42





THE

Malayan Agricultural Journal.

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THE Malayan Agricultural Journal.

JUNE, 1935.

EDITORIAL.

Poultry in Malaya.

One approaches the subject of poultry-keeping in Malaya with some diffidence, because it is a subject which, in spite of the pioneer work of a number of enthusiasts and the investigations of the Department of Agriculture, still bristles with uncertainties.

While not wishing to belittle the work of those who, at considerable personal expense, have in the past imported pedigree stock, one cannot help being struck by the fact that much of the experience gained by these pioneers has been lost to the country. They were ever ready to give specific information to those who visited them, but unfortunately they have not placed on record detailed accounts of the methods they employed and the results—favourable or otherwise—of the trials conducted by them. Had they pooled their information it is possible that our knowledge of this subject, and their own, would have been materially advanced.

Many aspects of poultry husbandry cannot be studied accurately by the private individual. We are informed, for example, that two flocks of not less than fifty birds each are essential to provide a satisfactory degree of significance on any one problem of nutrition. Very few individuals in this country are in a position to carry out exhaustive investigations of this character, which points to the necessity of establishing long-range research at a convenient centre.

The work of the Department of Agriculture at the School of Agriculture, Malaya, and also at certain of the Agricultural Stations, has been confined, so far, almost entirely to a preliminary study of imported pure breeds and their progeny, of housing, and of balanced rations obtainable, as far as possible, from local products. Some success in these directions has already been achieved, and propaganda has been initiated to improve the conditions under which poultry are kept on small holdings, but a number of important problems have arisen which require detailed investigation. An examination of the results so far obtained, reveals that there is as yet no unanimity of opinion. This indicates the desirability of re-organising and centralising the investigations so that fundamental research can be placed on a basis which will render the results authoritative, and enable advisory work to be conducted with assurance.

Poultry husbandry, in fact, remains very largely the problem that it was, and any well-informed contribution to local information on this subject is of value. For this reason, we publish an article in this number, entitled "Poultry Husbandry in Malaya" by Mr. G. E. Mann, of the School of Agriculture. This is not designed to be an exhaustive account of the subject; this would be impossible at the present stage. It is, however, a statement of the present position of poultry keeping in Malaya. It marshals a number of undisputed facts, and draws attention to points which are apt to be overlooked or misunderstood, especially in relation to nutrition. The growing volume of correspondence which we receive from all parts of Malaya is evidence that poultry husbandry is engaging the attention of a constantly increasing number of people, and to such as these, this article will doubtless prove of considerable interest.

The Control of Fruit Canning.

Recent numbers of this Journal have contained information concerning present-day fruit canning methods and trade in the United Kingdom. This survey of the industry is concluded by the inclusion in this issue of an article on "The Control and Organisation of Fruit Canning in the United Kingdom". The growth of the trade has rendered a measure of control desirable; but further than this, control and organisation has contributed to the growth of the trade. The present article sets forth the factory conditions insisted upon, details of the voluntary National Mark system of grading and inspection, which has proved to be a factor considerably influencing the extension of the trade, and the advertising and trade organisation which has further strengthened the market for the United Kingdom canner. A watchful eye is kept on the industry by the National Food Canning Council, which body has been able to safeguard the consumer and protect the interests of canners and growers. The organisation has the advantage of efficient technical advice, while research is constantly bringing about improvements which are to the benefit of both producers and consumers.

Comparisons between the United Kingdom canning industry and that in Malaya are inevitable. In the course of these articles several such comparisons have been made. There is evidence that the Malayan canning interests are becoming more alive to the desirability of re-organisation so that the enviable position of Malayan canned pineapples on the Home market may be fully maintained, while our sales in other markets may be stimulated and increased.

Fallow Crops on Padi Land.

In view of the fact that in most parts of Malaya the padi crop occupies the land for only about six months in the year, suggestions have, from time to time, been advanced for more intensive use of these areas by producing two crops of padi per annum, or by the utilization of the areas for other crops after the padi has been removed.

To produce two crops of padi per annum, the cultivation of varieties of short maturation period would be necessary in place of those at present planted which occupy the land for longer periods. There is a definite relationship between the maturation period and yield, and it is doubtful whether the cultivation of two light crops per annum instead of one heavy crop would prove advantageous. In many areas, also, such a course would not be feasible owing to irrigation difficulties.

The alternative of planting crops other than padi in the "off-season" suggests itself and is, in fact, occasionally practised on a small scale by Asiatics. Experiments conducted by the Department of Agriculture between 1932 and 1934 and summarised in this number indicate that the yield of crops so grown is disappointingly low. On the other hand, the observations made have not revealed any reduction in yield of padi as a result of two seasons' fallow cropping.

Original Articles.

POULTRY HUSBANDRY IN MALAYA

BY

G. E. MANN,

Vice-Principal, School of Agriculture, Malaya.

Poultry in the Village.

In common with prevailing conditions throughout the inhabited parts of the tropics, the Malayan homestead is not complete without its complement of fowls. Underfed, badly housed, if housed at all, mongrel to a degree, the vast majority obtain a livelihood by a process of scavenging. This state of affairs is regarded by the Malays with such complacency that it has provided an expression in the vernacular which is exactly parallel to the English metaphor of "leading a hand-to-mouth existence".* Here and there, an occasional Chinese may be found digging up the soil and exposing its scanty population of worms and grubs to the eager beaks of his flock; but, apart from a few isolated and sporadic efforts, there has been practically no effort at poultry husbandry as understood in the temperate zones, and the production of eggs and flesh as an organised industry is still largely undeveloped. Contrary to first impressions, however, the typical Malayan poultry farmer is not entirely devoid of an economic sense. His cost of production is negligible and his produce, however small, is almost all profit, whether it is consumed at home or sold for cash. In such circumstances, it is open to doubt whether any marked approach can be made to better standards of management and breeding unless it is first demonstrated conclusively that the greater cost of production involved will be repaid by even greater profits. One cannot be too cautious in problems of this kind, and nothing but the results of practical investigation should be accepted as reliable evidence. The required information has not been forthcoming in the past, but investigations have recently been inaugurated by the Department of Agriculture with a view to exploring the whole problem, first in its wider aspects and subsequently in detail.

So far, it would appear that improved poultry farming might, with efficient management, yield returns in Malaya commensurate at least with those obtainable in England and elsewhere; but that profits would not be sufficient to justify high wages or to tolerate inefficient management.

Malayan Production.

No complete census has ever been made of poultry in Malaya. As already stated, there is hardly a homestead in the country without at least a few fowls. In addition, ducks are fairly common, while pigeons are occasionally kept by Chinese agriculturists; but geese and turkeys are comparatively rare. A

* "*Kais pagi makan pagi, kais petang makan petang*" (M) = "Eating in the morning what one has scratched up that morning; eating in the afternoon what one has scratched up that afternoon".

deliberate census would not only be very difficult and costly, but it would probably prove to be so inaccurate under present conditions that it would be of doubtful value. In 1933, however, it was estimated that there were at least two million head of poultry in the Unfederated Malay States and one and a half millions in three of the four Federated Malay States. It is therefore not improbable that the total for Malaya, which includes the more densely populated Straits Settlements, is in the neighbourhood of six millions. The produce is of poor size and quality, market prices are low, and the annual value of internal production is correspondingly small. There are no exports.

Imports.

That there is scope for the increased production of both eggs and table birds is apparent from the fact that Malaya is not self-supporting in respect of these foodstuffs. The average value of imported poultry produce for the ten year period 1924—1933 was nearly \$1½ millions per annum, a by no means inconsiderable sum to leave the country when it is realised that local poultry keeping, even if extended considerably, need not compete with other agricultural pursuits. Live poultry come mainly from Siam, while eggs are imported almost entirely from China and French Indo-China.

Breeds.

This country has its own variety of fowl, namely the Malayan game fowl. It is characterised by a broad head with overhanging eye-brows, the beak, skull and top of the neck forming practically a continuous curve like the upper half of a circle; walnut comb; long, straight limbs; square and prominent shoulders; sloping back; tail carried rather low, feathers free from lacing and spangling, narrow and short, causing the bird to look lighter in weight than other game varieties with which, however, it compares favourably when placed on the scale. The Malayan game fowl has been considerably improved in the hands of European fanciers and is usually represented at the larger poultry shows in England, but good specimens are rare in this country. Its walnut comb is of scientific interest, as it can be reproduced by crossing the rose comb with the pea comb—a discovery which has thrown considerable light on the phenomena of heredity.

As already stated, the vast majority of domestic fowls in the Peninsula are sheer mongrels. In such circumstances, it is impossible to describe them precisely. The average hen reaches a live weight of about 3½ lbs., with an egg production of about 30 per cent. (*i.e.* about 100 eggs per annum) during the pullet year. The eggs vary considerably, but seldom exceed 1½ ozs. in weight, and they are mainly light-shelled. The Chinese keep a type of fowl known locally as the "Canton" type. It is somewhat better than that kept by Malays and is presumably the offspring of remote imported ancestors.

Various pure breeds have been introduced privately from time to time, such as the Barred Rock, Leghorn, Australorp, Black Orpington, Sussex and Rhode Island Red; but these importations have usually proved a loss to the owners owing to the ravages of disease or the depredations of thieves. Increasing attention, however, is now being devoted to the commercial prospects of pure and cross-bred birds. Without being definite on the subject, in view of the fact that our knowledge is still imperfect in various directions, it is considered that the Rhode Island Red offers the best prospects for egg production and that the Light Sussex may prove a good second. At the School of Agriculture, Serdang, the former breed has been shewn to stand up to the climate and to retain its fertility and productivity for two generations, but experience of subsequent generations has yet to be obtained. Parallel investigations with the Light Sussex and White Leghorn are inconclusive, but there is a grave doubt whether the latter possesses the necessary stamina for a productive life on the plains. Information is also being sought as to whether, from the commercial point of view, pure-breds will prove superior to cross-breds or *vice versa*. It is not unreasonable to assume that a policy of upgrading, if soundly conceived and boldly executed, would lead to fruitful results and possibly to the evolution of one or more new Malayan breeds. The problem is complicated, however, by the necessity of determining whether or not the local fowl is able to contribute anything in this process of upgrading. One usually expects native stock to possess at least some degree of resistance to disease, but it has yet to be established that this desirable character actually does exist.

Management.

As applied to conditions typical of Malaya as a whole, the term "management" is a misnomer, for the average flock receives practically no attention of any kind. Fowls are generally allowed free range by which they acquire an uncertain amount of food in the form of insects, seeds, grass, household scraps, and occasionally a handful of *padi*,* but little if any effort is made to provide a definite and regular ration or to employ suitable and hygienic utensils. In the circumstances, food and water are liable to serious pollution and the fowls are doubly handicapped by insufficient and contaminated food. Similar neglect applies to housing, breeding and rearing. The flock must find its own protection, except where it is cooped up by night beneath the house where sunlight cannot enter and where the ground inevitably becomes foul at an early stage. The cockerels are not segregated from the pullets, with the result that inbreeding with all its attendant evils is the rule and not the rare exception. Eggs are laid in quiet but scattered places, frequently none too clean, and the task of collection is relatively slow and uncertain.

For hatching, the broody hen is commonly employed. There is seldom any difficulty in finding a broody hen when required, but the preliminary dusting with insect powder which forms a part of standard practice in England

* *Padi* (M) = unhusked rice.

has no counterpart at present in the Malayan homestead. The young chicks, which hatch out in anything from 19 to 21 days, receive no special care from the owner; like their parents, they have largely to fend for themselves, and losses through malnutrition, pests and exposure are consequently heavy.

Advisory work in relation to the improvement of poultry husbandry among small-holders is now proceeding along simple lines throughout the country, agricultural officers devoting a considerable portion of their time to encouraging a better standard of management. They are equipped with models of well ventilated slatted-floor night-arks, food and water utensils, nesting boxes, foster-mothers and so on, and they give periodical lantern lectures with the assistance of a propaganda caravan maintained conjointly by the Department of Agriculture, the Co-operative Societies Department, and the Rubber Research Institute. In addition, information as regards feeding is being accumulated and disseminated, and supplies of pure-bred and upgraded cockerels are gradually becoming available for distribution from the School of Agriculture and Agricultural Stations generally. Progress is of necessity slow, but the important fact is that a beginning has been made.

Feeding.

One of the major problems confronting the agricultural instructor and the progressive poultry farmer in Malaya is that of finding a balanced but economical ration which can be kept reasonably free from moulds. As in other countries, cereal grains must form the basis of the food supply, but they should be supplemented by additional proteins. Locally grown cereals are limited to *padi* and maize; while imported cereals such as wheat and oats, together with their offals, are expensive. Local and imported groundnut and soya bean cakes are reasonably cheap, but one must insist on good quality; and animal proteins are essential if a scientifically balanced ration is to be secured. There are at present no suitable supplies of locally manufactured white fish meal or meat and bone meal, and one is more or less compelled to fall back upon imported whale meat meal. Even with these ingredients at hand, dry mash remains in good condition for a few days only, unless stringent precautions are taken to protect it from the atmosphere, and it is generally unsafe to prepare more than a three days' supply at a time.

The following mashes (Table 1) are stated to have been found satisfactory in Malaya. The figures refer to parts by weight.

In addition to the mash, growers are given a gradually increasing—and layers an approximately equal—quantity of *padi* in the evening. The actual weight of mash required by a given bird depends on its size and condition rather than on its age. In general, it is advisable to allow the flock to eat as much dry mash as it can consume before the evening meal of grain, and to reduce the amount of grain if there is any tendency to put on fat. As a

Table 1.
Composition of Mashcs.

Ingredients	Young chicks	Growing chicks	Layers
Padi, ground, husk discarded ...	11	23	4
Soya bean (or groundnut) meal ...	4	3	2
Whale meat meal ...	4	3	1
Mineral mixture (60 per cent. steamed bone flour, 20 per cent. salt, 20 per cent. powdered oyster shell) ...	3 per cent.	2 per cent.	2 per cent.
Red palm oil ...	2 "	1 "	1 "

rough indication, mature birds of the light breeds may be expected to eat an average of about 4 ozs. of food a day, while the heavy breeds will consume from 4½ to 5 ozs.

Experiments with these rations at the School of Agriculture during 1934 indicate that the layers' mash is definitely lacking in bulk, for increased production has been secured without lowering the condition of the birds in any way by adding a proportion of fibre to the ration. It might at first sight appear to have been a mistake to discard the *padi* husk, but such is not the case. Given the usual means of grinding *padi* on a small scale, it is impossible to reduce the husk to a coarse powder without grinding the seed itself too fine: in other words, the husk should be discarded, and fibre should be reintroduced in the form of bran.

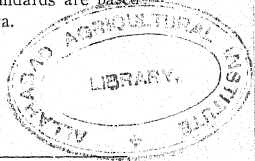
The claim that red palm oil is a convenient source of vitamin A has been borne out by recent investigations; but there should be no necessity for providing additional supplies of the various vitamins so long as flocks are kept on free range and can get plenty of sunlight, green food, and other natural foodstuffs which supply one or other of these vitamins. Moreover, in these rations, no use is made of yellow maize, the inclusion of which would not only add variety but would also help to improve the colouring of yolks and assist the farmer in culling flocks of the pigmented breeds. Finally, the chick mash would probably be improved by the addition of a trace of iron; while, in the case of laying hens and pullets, it is better to supply broken limestone or oyster shell separately rather than in the mash.

According to Halnan, the composition of the ration should approximate to the following standards, (Table 2) corresponding figures for the above-quoted

rations being included for purposes of contrast. The differences appear to be too large to be ignored, but it must be admitted that Halnan's standards are based on English ideas which have not yet been tried out in Malaya.

Table 2.
Comparative Rations.

Nutrients per 100 parts of ration by weight.



Halnan			Local		
	Digestible Protein*	Starch Equivalent*		Digestible Protein	Starch Equivalent
Young chicks ...	14.0	60.0	Young chicks ...	21.5	78.0
Growing chicks ...	11.5	64.0	Growing chicks ...	14.5	81.5
Layers ...	11.0	61.0	Layers ...	13.7	68.3

Bearing in mind the points which have been indicated above, the following rations (Table 3) have been evolved in accordance with those which at present prevail in temperate countries. They still require to be checked, however, by experimental work in this country.

As a matter of fact, there does not seem to be any obvious reason why the progressive poultry farmer should not adopt the system of feeding laying hens which was first advocated in relation to poultry by von Wendt and has since been approved by the Ministry of Agriculture and Fisheries in England. There is nothing really new in the system, for it has been practised for several years in the feeding of dairy cows. One has merely to devise the ration in two portions, the basic portion being sufficient for maintenance, growth and an anticipated minimum production, while the second and minor portion is readily adjustable to conform with fluctuations in actual production. The advantage of the system is obvious—that, as production varies according to the season, age, and condition of the flock, so the ration can be adjusted to ensure that requirements are met without waste and without overtaxing the digestive and excretory organs.

Thus, taking the case of heavy breeds such as the Rhode Island Red where the average weight of the hen is about 5½ lbs. and the minimum egg

* The Starch Equivalent of a foodstuff may be regarded as indicating its total food value for all purposes of the animal in question, while the Digestible Protein indicates how much of the foodstuff is available for use in building up the nitrogenous parts of the body and its produce. In the same way, it can be said that such-and-such an animal requires so much Starch Equivalent a day, of which so much should be Digestible Protein.

Table 3.
Suggested Rations.

	Ingredients	Young chicks	Growing chicks	Layers
MASH	Padi, ground, husk discarded ...	40	50	15
	Maize, yellow, ground ...	12	15	6
	Bran, white cargo ...	20	15	10
	Groundnut cake (or soya bean meal) ...	11	8	8
	Whale meat meal ...	12	8	8
	Steamed bone flour ...	2½	2½	2½
	Powdered limestone or oyster shell ...	1¾	1	—
	Salt ...	¼	½	¾
	Ferric oxide ...	¾	—	—
GRAIN	Padi, whole ...	—	—	40
	Maize, kibbled ...	—	—	10
	100 parts by weight, supplying approximately ...	D.P. | S.E. 14.3 | 65.0	D.P. | S.E. 12.0 | 69.5	D.P. | S.E. 12.0 | 63.5

production may be estimated at 40 2 oz. eggs per 100 days, the basic mash might well consist as follows:—

Padi, ground, husk discarded	...	33 parts
Maize, yellow, ground	...	11 "
Bran, rice*	...	30 "
Groundnut cake meal	...	12 "
Whale meat meal	...	12 "
Mineral mixture (5 parts steamed bone flour to 1 part salt)	...	2 "

The birds, which will consume about 4½ ozs. of food a day, should be allowed 2½ ozs. of the above mash plus about 1¾ ozs. of grain, consisting of 3 parts whole *padi* to 1 part kibbled yellow maize. If actual production is

* Where bran is employed in any considerable quantity (say over 20 per cent.), it should not be too fine in texture, otherwise the mash will form dough-like pellets when wetted by the saliva and will thus prove unpalatable.

above 40 per cent., then a calculated quantity of the following egg-production mash should be given as a wet mash at midday:—

Padi, ground, husk discarded	...	3 parts
Groundnut cake meal	...	1 part
Whale meat meal	...	1 "

Five lbs. of this egg-production mash are theoretically capable of producing 47 eggs. In other words, given a flock of 100 Rhode Island Reds laying 50 eggs a day (an increase of 10 eggs a day), one should add about 18 ozs. of wet mash to the daily ration of the flock as a whole.

The only objection to the von Wendt system is that it is not so simple as the customary dry mash and grain method, and that—in the hands of an ignorant farmer—feeding might soon become chaotic. All one can say is that it was designed and is recommended for the benefit of progressive farmers.

Artificial Incubation.

Returning to the subject of hatching, it is of interest to note the large-scale artificial methods used by Chinese poultrymen in the coastal parts of Perak, where considerable numbers of fowls and ducks are raised for sale both locally and in the neighbouring island of Penang. Each hatchery comprises a number of bamboo or rotan baskets, some two feet in diameter and three feet deep, supported on a wooden frame and insulated with dry padi husk. The sides and bottom of the basket are lined with removable cardboard, and a sheet of canvas is placed on the bottom. Alternate layers of eggs and canvas are then placed inside the basket until it is full, and the top is covered with sacking. One basket accommodates about 1,000 eggs, which should be new-laid and exposed to the sun for an hour or so before being placed in the basket. After about a week, the eggs are candled against a hole in a darkened window, and the fertile eggs are subsequently removed one or two days before hatching is complete. They are then laid on sacking on a stand in the centre of the room, and are covered with a blanket in which holes have been cut to enable the baby chicks or ducklings to emerge. When dry, they are placed in shallow, open, rotan baskets outside the house. The percentage hatch is about 70. Unfortunately, the same degree of skill and ingenuity is not shewn in subsequent stages, and mortality is usually high, particularly during the first three days.

Incubator machines are almost unknown in Malaya outside a few more enlightened centres such as the various Agricultural Stations throughout the Peninsula. Where they are employed, satisfactory results are usually obtainable so long as factors governing fertility are carefully observed and the temperature of the machine adjusted to suit local climatic conditions. The temperature of a broody hen on the plains in this country is not more than 101°F., as compared with 103°F. in England, and the incubator (the operation of which should imitate nature as far as possible) should therefore be run at an initial temperature of 100°–101°F., falling gradually to 99°–100°F. by the

end of the hatch. The chicks should be removed to an outdoor brooder as soon as they are dry, the usual precautions being taken not to help a chick out of its shell or to keep any that are deformed or obviously weak; and they can be hardened off in three to seven days according to weather conditions at the time. The European type of foster-mother has given excellent results, but artificial heat is really unnecessary except during inclement weather, when a hurricane lamp suspended from the roof is sufficient. A permanent heating system is thus merely an extravagance. In fact, all that is required for small-scale operations is a packing case, such as is used for tinned provisions, provided with a roof and leading to one or two similar boxes covered with wire netting. The principal box, with the chicks, can be lifted inside the house at night, and replaced on clean, dry ground the following morning. As a refinement, whereby the foster-mother can be left out all night without even the necessity for a lamp, the apparatus should be constructed on the hay-box principle. Provision must be made, of course, for adequate ventilation without draughts and for protection from rats.

Table Poultry.

The standard of table poultry in Malaya is almost as unsatisfactory, from the European point of view, as that of eggs. The greater part of the population nevertheless appears to be quite satisfied with what is at present obtainable. The demand for large birds suitable for roasting is negligible in comparison with that for small, cheap birds good enough for inclusion in a curry. These latter are marketed alive at from $2\frac{1}{2}$ to $3\frac{1}{2}$ lbs. weight. They are no longer young, and they are usually in poor condition. Imported dressed poultry, on the other hand, is of very good quality but is expensive. There is at least a *prima facie* case for encouraging the improvement of local table birds by increasing the proportion of meat to bone, provided that the size and cost per pound are kept within the limits of the average man's purse. The slow rate of growth of the local fowl renders it coarse and uneconomical as a commercial table-bird. Better feeding alone cannot entirely overcome this objection, as body size is fundamentally a matter of heredity; and the possibility of upgrading or of using cross-bred cockerels (*e.g.* R.I.R. x Light Sussex) is therefore indicated in order to produce a bird which can be sold at a profit either direct from the run at 12—13 weeks of age or a fortnight later after crate-fattening.

The demand for *petit poussins* and capons is comparatively small. The former do find their way into hotels and better-class restaurants; but the latter are in demand only in connexion with certain seasonal festivals such as Chinese New Year. The operation of caponising is usually conducted by wandering Chinese whose charges are fairly reasonable and whose work is tolerably satisfactory. Seeing that the operation is comparatively easy and

requires very little equipment, there does not seem to be any reason why it should not be carried out by the actual farmers themselves.

Disease.

There has been a tendency in Malaya for some time past to assert that the sole difficulty in the way of improving local poultry is the incidence of disease, and that the only effort which is fundamentally necessary is the provision of adequate means of prevention and cure. On the other hand, it has been claimed in various quarters that the disease problem is purely secondary, resulting from improper housing and feeding; and that, once these conditions of management are improved, disease will automatically be reduced to insignificant proportions. There is, however, no question that disease does at present constitute a very serious obstacle to successful poultry farming in Malaya. Flocks of chickens are periodically decimated or even entirely wiped out by waves of disease the precise nature of which is at present unknown. It is commonly referred to as "*the disease*"; but it is by no means improbable that more than one specific organism is actually involved. Judging by experience elsewhere, it is to be anticipated that, whereas careful housing, feeding and breeding may rapidly reduce the incidence of disease in general by improving the physique and stamina of our flocks, good management alone can never succeed in entirely eradicating disease. In England and America, where the standard of management is comparatively high, poultry diseases are actually on the increase instead of on the wane. To what extent this is due to the increased virulence of the pathogenic organisms involved or to defects in modern systems of breeding cannot be stated with certainty—both factors are probably involved. One thing, however, which is certain is that, so far as the farmer is concerned, the problem of poultry disease must be tackled in Malaya along the same broad lines as in England. He must learn to segregate all new birds for a suitable period after their arrival on the farm; to isolate and preferably to kill immediately all birds which shew the symptoms of serious disease; to keep his buildings and foodstuffs clean; and to prevent his ground from becoming foul, either by the rotation of his land or, if the birds are kept intensively, by keeping them off the ground altogether. In addition to encouraging sounder methods of prevention along these lines, research has just been begun by the Veterinary Department into the organisms involved in local outbreaks of disease. It is at present impossible to make any definite statement, but there are indications at least that either fowl pox and Newcastle disease, or local diseases closely resembling these two, are present in the country. Among minor complaints, colds, diarrhoea, crop-binding, intestinal worms and external parasites such as mites are very common. The nature and control of these maladies in Malaya are similar to those elsewhere, and call for no comment in this place.

Other Forms of Poultry.

Little can be said concerning other forms of poultry such as ducks, geese, turkeys and pigeons. Attention has already been drawn to the fact that, while

ducks are plentiful in Malaya, the other kinds are comparatively rare. Ducks abound in certain areas where irrigated rice is cultivated by Malays, and they can play quite a useful part in the control of various insect pests of that crop such as *Scotinophora coarctata*; but it is among the Chinese that the better birds are to be found. The duck is valued by the Chinese for its flesh, and by all Asiatics for its eggs which form practically a *sine qua non* in a good curry. Moreover, it is a much hardier bird than the hen, and losses by disease are nothing like so serious. There are possibilities in Malaya for extending the production of duck eggs, but the position as regards table ducks is not clear. Among pure breeds which have occasionally been imported for trial, the Khaki Campbell and the Indian Runner are alone worth mention. Good specimens of locally bred geese and turkeys are also sometimes seen, but they are at present of little economic importance. With turkeys on free range, liability to disease constitutes a serious limiting factor.

Marketing.

With the exception of a small amount of dressed poultry which is imported in cold storage, table birds in Malaya are invariably sold alive to the consumer. The owner either takes his surplus birds in baskets to the local fair or market, where he may sell them direct to the consumer or dispose of them through a dealer, or he sells at his house to Chinese higglers who complete the marketing process. There is no attempt at grading other than by weight and external appearance. A certain amount of cramming is practised, but it is not very effective.

Eggs are disposed of mainly through the same channels, but there is some attempt at group collection among Chinese squatters in the neighbourhood of towns, while co-operative collection and sale is practised among Malays in Krian, the eggs being graded and sold mainly in Kuala Lumpur, Ipoh and Penang. Where large numbers of eggs are to be transported, they are packed either in open baskets or in boxes or barrels full of *padi* husk. In the former method, 120 eggs are called 100 to allow for breakages and theft *en route*, while in the second method breakages average only 1 to 2 per cent. Eggs sold in the market are seldom guaranteed, although bad eggs are usually replaced to regular customers after a certain amount of argument, and purely as a concession.

The Krian co-operative system of marketing is worth description. The members of the society bring their eggs daily to the collecting *dépôt* where they are candled, eggs with blemishes or large air-spaces being rejected and sold locally. Accepted eggs are stamped, packed in boxes with *padi* husk and railed to the principal market towns where they are sold under guarantee by agents. The Society handles 25,000 eggs a month and claims that members gain an extra income over the whole year by selling their eggs in this manner.

Poultry Shows.

Small poultry shows have been held in Malaya for a comparatively large number of years. The earlier efforts tended to be purely local in organisation; they were supported mainly by Europeans, and they had no real influence on the poultry of the country as a whole, particularly as the exhibition type of bird was inclined to predominate. With the formation of the Malayan Agri-Horticultural Association in 1922, however, poultry sections were designed to bring in a much wider range of exhibits and exhibitors, and the purely local societies gradually disappeared and were replaced by District Agricultural Shows.

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THE CONTROL AND ORGANISATION OF FRUIT CANNING IN THE UNITED KINGDOM

BY

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Factory Lay-out.

As stated in a previous article on fruit canning* the lay-out of the factory is of great importance. For registration under the National Mark Scheme canneries are required to comply with very rigid standards, and as these are of considerable interest in view of the Malayan position they are reproduced below.

The following requirements must be complied with by authorised canners:
Minimum Technical Requirements.

(a) Buildings.

All buildings including floors must be clean and capable of permitting hygienic production.

(b) Equipment.

- (1) Must be designed to give the maximum technical efficiency.
- (2) Syrups: (i) Hand syringing by dipping is not allowed; (ii) syrup strength must be controlled by means of hydrometers.
- (3) Exhaust: An exhaust process is compulsory.
- (4) Headspace: (i) Headspace must be controlled by tilting of the can after the syrup has been added, or by "plunging" or "ramp" after the exhaust process. (ii) Vacuum and headspace control must be practised.
- (5) Seaming: Seaming machine must at least be semi-automatic.
- (6) Cooking: Retort cooking for vegetables is compulsory.

Factory Conditions.

In addition to the statutory conditions of the Factory and Workshops Act 1901 and of the Welfare Order for the preserved fruit industry (S.R. & O. 1136 1919), the following requirements must be observed:

- (a) All working floors to be washed or hosed daily with water and disinfectant.
- (b) All working parts of machinery liable to contact with fruits, vegetables or syrups to be steamed or otherwise sterilized daily during packing operations. All grading tables and all fabric or rubber grading belts, etc. to be sterilized daily and removed and scrubbed once a week during canning operations.
- (c) (i) All workers to wear clean overalls or armlets and aprons; (ii) the hair of women workers to be covered; (iii) the hands of workers to be washed after meals or absence from the packing tables; (iv) fruit not to be accepted in dirty containers. All containers other than

*The Canning of Fruit in the United Kingdom, by H. A. Tempany, *Malayan Agricultural Journal*, Vol. XXIII No. 5, 1935.

new ones supplied by the factory to be sterilized and marked in some effective manner before issue to growers.

Supervision of Canning Operations.

Adequate supervision is absolutely essential. As regards any factory where supervision is considered by them to be inadequate, the Ministry's officers are empowered to take the matter up with the canner concerned, and if this defect is not satisfactorily remedied a report is to be made to the Ministry for reference to the trade committee.

Quality Control Samples.

Samples of the finished product will be collected by the Ministry's officers at factories or at retail premises for analysis. For this purpose samples of an authorised canner's packs may be collected at his factories at an average rate of one sample in five thousand, but where the Ministry's officer is satisfied that it is not necessary to draw so many as regards any particular factory, he need not do so.

The National Mark System of Inspection of Canned Fruits.

The National Mark Scheme for the voluntary grading and marking of canned home grown fruit and vegetables came into operation in June, 1930. Its object is to develop the market for supplies of canned home-grown produce by a policy of standardisation, involving definition of standards of quality and the marketing of supplies in accordance therewith under the National Mark.

The Agricultural Produce Grading and Marking Acts, 1928 and 1931, enable the Ministry of Agriculture and Fisheries to make regulations prescribing grade designations and marks for any kind of produce, and provide that for any person selling an article to which a grade designation mark is applied, it shall be deemed to be a term of the contract of sale that the quality of the article agrees with the definition of quality applicable to the grade designation. The National Mark design consists of an outline map of England and Wales with a circle inset bearing the Union Jack and an inscription "Produce of England and Wales".

The design and words are registered under the Trade Marks Act and are also protected from abuse by the Agricultural Produce Grading and Marking Act. Only fruit and vegetables grown and canned in England and Wales may be packed under the National Mark Act.

The scheme is open to canners of fruit and vegetables grown in England and Wales; persons or firms desiring to apply the mark must apply to the Ministry of Agriculture and, provided applicants agree to comply with prescribed conditions and procedure and the Ministry is satisfied that the minimum technical requirements already described can be complied with, authority to apply the mark may be granted. A National Mark Committee, with powers to authorise firms or individuals to apply the mark and to revoke

or suspend such authorisation in the event of failure to comply with the conditions, has been appointed by the Minister of Agriculture, while a trade committee consisting of growers, canners and distributors, has also been appointed to advise the National Mark Committee in regard to the issue of authorisations to apply the National Mark and to advise the Minister on the general administration of the scheme.

An inspection service is maintained by the Ministry and the system seeks to ensure that (a) only home-grown produce is used; (b) that the standard of the quality of the raw product is maintained, and (c) that the requirements regarding the quality of the finished produce are complied with.

Authorised canners may apply the mark only to cans containing produce which they are satisfied conforms to the definition of quality prescribed.

Standardisation of containers is an essential feature of the scheme and dimensions have been fixed for the sizes of cans permitted thereunder.

Every can to which the National Mark is applied must bear a distinctive lid mark to be applied only by the authorised canners to fruit or vegetables canned by them. Canners are required to supply the Ministry with a list of the lid marks intended to be used by them.

Stocks of canned fruit or vegetables to which the National Mark has been or will be applied, must, so long as they remain on the premises of the canner, be stacked in such a manner that the cans packed on any particular day are segregated.

Authorised canners are required to keep records showing the quantity and source of every consignment of fruit or vegetables received and canned by them under the National Mark.

An authorised canner must allow any duly authorised officer of the Ministry to inspect his premises, equipment, stocks and records at any reasonable time, to take samples of fruit and vegetables going forward to be canned, to be present when National Mark fruit or vegetables are being canned, and to draw samples from National Mark canned fruit or vegetables stacked ready for sale.

It is stated that of the seventy-four factories at present engaged in canning fruit and vegetables in the United Kingdom 80 per cent. adhere to the National Mark scheme. The inspection service for canned fruit and vegetables comprises one Chief Inspector with two assistants. With this staff it is found practicable to visit every factory under the scheme once a fortnight.

In inspecting factories officers make a general tour of the factory and direct attention to any points that appear to require it; they draw samples of produce from stock and these are sent, with a label giving particulars concerning the time and conditions under which they were drawn, to the Fruit and Vegetable Canning Research Station at Campden. The samples are examined and reported on at Campden under the supervision of the Director, a trained staff being maintained for the purpose.

At present only one grade is prescribed under the National Mark; this is considered a disadvantage inasmuch as it tends to grade down the highest qualities of produce to one common standard; the question of establishing two standard grades for canned fruit and vegetables is, it is understood, under consideration. Before the Mark was introduced there were no standards for canned fruits and vegetables in England. The introduction of standards and the systematic inspection of the canned products have resulted in a steady improvement in the quality of the pack year by year.

The Scheme is stated to be working well and provides a possible basis for the introduction of a similar grading provision into the Malayan industry with modifications to suit local conditions.

Advertising and Trade Organisation in relation to the Trade in Canned Fruit.

Under the existing system of marketing, Malayan canned pineapples are purchased in bulk by importers who affix their own labels to the cans irrespective of the cannery from which the produce emanated. There are upwards of seventy different brands of Malayan canned pineapple on the market, although only sixteen factories exist; in this way the same brand may emanate from a number of different factories.

The only advertisement which the industry receives is the displays made by the Malayan Information Agency at Fruit Shows and Exhibitions, although certain firms which distribute canned goods include Malayan canned pineapples in their exhibits at the trade shows, such as The Grocers' Exhibition.

The Malayan Agency obtains produce for these displays from importing firms and by direct importation; it is remarkable, however, that although their efforts have undoubtedly increased sales they have so far received no financial assistance or support from the packers and very little from the distributors. The total sum which the Agency has available for these displays amounts to £150 to £200 per annum which, in view of the size of the trade, is very inadequate.

In the British canning industry, on the other hand, great insistence is laid on the product being packed and marketed under labels which show clearly the name of the organisation which is responsible for the manufacture. In some cases canneries are organised into groups for the purpose of marketing their produce under one brand, in others single factories market their produce under their own factory mark.

Furthermore, individual firms, group organisations and the Ministry of Agriculture annually expend large sums in display and advertisements.

At the various trade Fairs many of the organisations erect and stage exhibits, and representatives are in attendance for the purpose of supplying information to prospective customers. They also advertise extensively in the daily papers and trade journals and by means of public displays on hoardings.

In addition to this, the Ministry of Agriculture makes extensive displays in connexion with the National Mark scheme for canned fruit and vegetables, at trade shows and exhibitions, and undertakes publicity campaigns by means of direct advertising. The sum annually expended by the Ministry of Agriculture in this connexion is stated to amount to £10,000 per annum, while if to this is added expenditure by private agency, the total is very much greater.

It is at present considered by the import trade that display and advertising of Malayan canned pineapples is unnecessary as, owing to the cheap price at which the fruit is put on the market, it sells itself. The present writer ventures to doubt whether this is an entirely sound conclusion. The industry is in a position in which its profits are very small and it is faced with considerable competition. In order to retain its place in the market an improvement in methods of sale, greatly increased expenditure on advertising and display, and more wholehearted co-operation on the part of the producers and distributors in official efforts to advertise the product, combined with improvement in quality and method of production, are needed. These necessary improvements apply not only to England but to Canada. It is clear that considerable opportunities exist for extending the trade in canned pineapples in Canada provided adequate publicity can be secured.

Principal Activities of the National Food Canning Council.

The various interests concerned in the British canning industry are represented by the National Food Canning Council, the objects of which are as follows :—

1. To collect and collate information as to the treatment of various products; to organise investigations at home and abroad, and to advise as to the most suitable operations for various parts of Great Britain,
2. To secure the interest and activity of the Government and Parliament in this branch of agricultural development and in particular to advise as to the application of subsidies or other forms of financial assistance.
3. To interest growers and others in the establishment of local canning schemes.
4. To further such projects in every way possible, and in particular by the exchange of technical and scientific information and assistance.
5. To secure the highly necessary drafting and recognition of rules as to grading and other standards, and as to labels, marks, and other features.
6. To obtain the most favourable support of wholesale and retail grocers and other distributors.
7. Through the press and other forms of publicity to educate the public to medical and other recommendations of canned produce.
8. To secure the cheap and plentiful supply of standard cans.
9. To assist the industry in respect of railway and other transport facilities.
10. To encourage the manufacture of specialised and improved machinery and appliances in Great Britain.
11. To promote the development of an export trade for our agricultural produce by participation in the world market for canned food.

12. To act as a common centre of advice and help for tin-plate manufacturers, can makers, machinery makers, canners, growers, bankers, distributors, and the public, in the establishment and expansion of a serviceable and flourishing canning industry which will provide for the community throughout the year at reasonable prices a greater variety of healthful fish, fruits, and vegetables, and other foods in the most hygienic and convenient form.

When the highly organised position of the British industry in respect of marketing, advertisement and representation is contrasted with that of the Malayan industry the difference is so striking as to call for no further comment.



FALLOW CROPS ON PADI LAND IN PROVINCE WELLESLEY

BY
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It has often been remarked that the system, general in Malaya, by which padi land is allowed to lie fallow during a considerable part of the year, is wasteful, but doubts have been expressed as to whether the land can be satisfactorily cropped during this period, and as to the effect of such a practice on the yields of padi in the following season.

The trials described in this note were undertaken with the intention of elucidating these points. It is necessary to emphasize that the inferences drawn are relevant to the conditions prevailing over large areas of Province Wellesley, but they cannot be regarded as generally true for other localities. Briefly, these conditions are as follows:—

- (a) A reasonably predictable rainfall during the off-season with small probability of long periods of severe drought or excessive flooding.
- (b) Adequate drainage facilities.
- (c) A sufficiently long off-season to provide some latitude in the matter of planting dates if conditions are not suitable immediately after harvest.

It should further be added that the trials were conducted on the shallow type of rice field suited to medium term padi varieties.

1932 Trials.

In 1932 three-quarters of an acre were planted with vegetables. Unfortunately, this line of work was not decided upon until rather late in the season and planting could not be commenced before May 3rd, so that the land had to be cleared for padi before most of the vegetables were fully mature. Long beans, however, were harvested and gave a satisfactory crop. Ladies' fingers, soya beans and groundnuts made good vegetative growth but chillies were backward.

Trials in 1933.

In 1933, in addition to vegetables two varieties of tobacco were included (Kedah and Thattayan). All crops were sown in March.

Long beans, cucumbers, brinjals, ladies' fingers and chillies made satisfactory growth, but yields were low. Groundnuts and sweet potatoes gave negligible crops and great difficulty was experienced in harvesting these varieties owing to the hardness of the soil. It is to be noted, however, that on light padi

soils, such as those at Tasek Junjong (Province Wellesley South) sweet potatoes have been successfully grown as fallow crops by padi cultivators. Loofah also proved a complete failure owing to periodical flooding which apparently affects this crop adversely. Tomatoes for the most part succumbed to wilt disease.

Tobacco of the Kedah type made satisfactory progress, but yielded at the rate of only 3 cwt. dry leaf per acre—a low yield probably due to waterlogging of the land during the growing period. The Thattayan type never really recovered from the initial setback caused by flooding; the plants remained small in size and unhealthy in appearance, so that this variety would seem to be unsuited to the rather unusual conditions of the trial.

Trials in 1934.

As a direct result of the experience of the previous two seasons the following changes were made in planting the 1934 crop:—

- (a) In place of the ordinary broad beds, about 1 foot high, the land was thrown up into ridges 2 feet high.
- (b) All crops received a dressing of buffalo pen manure at the rate of 3 tons per acre.

Results obtained were as follows:—

Variety	No. of Plants	Date Sown 1934	Date of final Plucking 1934	Maturation Period	Yield (in lbs.)
Long beans ...	128	May 16th	July 17th	63 days	43
Ladies' fingers ...	128	April 14th	August 8th	121 days	92
Ladies' fingers ...	128	May 14th	August 28th	106 days	39
Chillies ...	256	March 12th	August 28th	170 days	55

The yields showed an improvement as compared with those of the previous year, but remained low. As in the preceding season, loofah and bitter cucumber proved complete failures and yields from groundnuts were negligible; cucumbers also failed. Tobacco made very satisfactory growth and it is greatly to be regretted that the crop could not be brought to maturity before it became necessary to prepare the land for the next season's padi.

Effect of Fallow Crops on Yields of Padi.

The view has been expressed by Malays in Province Wellesley and elsewhere that the cultivation of vegetables between padi crops is objectionable in so far as it reduces the yields of padi. On the land available at Bukit Merah

it has not been possible to lay down a statistically conclusive experiment to settle this point, but during 1933 and 1934, the area which had been fallow-cropped for two successive seasons, without manure other than a very small amount of wood ash, was laid out as an experiment which had been duplicated in somewhat modified form on an adjoining piece of land not previously cropped with vegetables. In each case the same variety of padi (Seraup 36) was used and accurate records of plot yields were taken at harvesting. The results obtained were as follows:—

	Mean Yield of Padi per Plot in lbs.	Size of Plot.	Yield in lbs. per acre.
Area cropped with vegetables ...	23.75	1/160th acre	3,800
Area not so cropped ...	23.6	1/120th acre	2,832

Though the matter cannot yet be placed beyond dispute it would appear that no serious reduction in yield of padi may be expected to follow two seasons' fallow cropping with vegetables.

Conclusions.

The work that has so far been carried out points to the conclusion that though many food crops will make satisfactory growth when planted on padi land during the off-season, yields are likely to be low, and not of the order expected under market garden conditions, though greatly increased yields could no doubt be obtained by more intensive cultivation and manuring (such as practised by the Chinese in Malacca).

2. Results obtained with tobacco are sufficiently promising to make further work with this crop desirable though its relatively long maturation period would limit the number of localities in which it could successfully be cultivated during the fallow season.

3. The observations so far made have not revealed any reduction in yields of padi as a result of two seasons' fallow cropping.

THE MALAYAN VEGETABLE-OIL INDUSTRY 1934

BY

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Agricultural Economist.

The Malayan vegetable-oil industry, which includes the various raw materials from which such oils are obtained, the oils and the by-products, falls naturally into two categories, *viz*: products of which exports exceed imports, indicating an extensive local production; and crops of which imports exceed exports. In the first category only coconut and oil palm products are of any importance.

Coconuts.

Prices.—Local prices of coconut products during 1934 were the lowest on record. The lowest price quoted in Singapore for the "sun-dried" quality for copra was \$2.55 per picul on 5th April, and the highest price for the year on 31st December when it was quoted at \$3.30 per picul. The average price for the year was \$2.94 per picul, as compared with \$3.89 per picul in the previous year. The average price of the "mixed" quality was 50 cents per picul lower than the "sun-dried".

On average London prices for the year, Ceylon obtained a premium over "Straits" copra of over 14 shillings per ton, and a premium over Java copra of 12 shillings per ton. On the other hand, Straits copra commanded a premium of 5s. 9d. over Philippine copra and 5s. 11d. over South Seas copra.

COCONUT OIL.—The average price for the year in Singapore was \$5.96 per picul as compared with \$7.70 per picul in 1933.

"POONAC" (coconut cake).—The average wholesale price in 1934 was \$1.28 per picul. During the first half of the year the price was around \$1 per picul; thereafter it appreciated, until in December it was quoted at \$1.70 per picul.

Production and Exports.—Despite the low market price ruling for coconut products in 1934, the total volume of the Malayan export trade was well maintained, being but 1½ per cent. less than the record figures attained in 1933. The nut equivalent of the net exports of coconut products was 695,142,000 while in 1933 it amounted to 704,714,000 nuts.

No means are available for estimating, with any reasonable degree of accuracy, the total production of coconut products in Malaya. By reason of the lower purchasing power of the Malays, the manufacture of coconut oil in the homestead was definitely more popular during the year, and it is probable that the actual production of coconut products in 1934 was fully equal to that of the previous year.

COPRA.—The net exports of copra were 95,599 tons, valued at \$5,864,692, as compared with 110,298 tons, valued at \$8,989,098 in 1933. The imports

into Malaya amounted to 94,634 tons valued at \$4,115,438. This is a decrease in quantity of over 5,000 tons as compared with the year 1933. The Netherlands Indies supplied 85,131 tons (or 90 per cent.) of the imports, the remainder being derived within the Empire. The gross exports of copra were 190,233 tons of which 129,888 tons (68 per cent.) were consigned to the Continent of Europe, 52,385 tons (27.5 per cent.) to the United Kingdom, and only 2,506 tons (1.3 per cent.) to the United States of America. In the previous year 66 per cent. of the exports were consigned to the Continent of Europe, 23.5 per cent. to the United Kingdom and 8 per cent. (or 17,618 tons) to the United States of America. The fall in exports to the last-named country is accounted for by the imposition of a very high processing tax in the United States.

FRESH COCONUTS.—The net exports of fresh coconuts were 10,080,400 nuts as compared with 10,370,600 nuts in the previous year. The import of nuts into Malaya is negligible. The fresh, husked nuts are derived mainly from South Kedah, Penang and Province Wellesley and are shipped mainly to Burma.

COCONUT OIL.—Since the year 1929, the net exports of coconut oil have shewn a progressive increase. The 1933 net exports at 17,582 tons were 5,633 tons in excess of the year 1932. The net exports during the year 1934 were 25,485 tons, valued at \$2,322,358. The imports into Malaya were only 313 tons.

Shipments were made to a number of countries, mostly in Asia, *e.g.* the Netherlands Indies 5,448 tons, British India 4,672 tons, China 2,941 tons, Egypt 2,465 tons, Burma 2,338 tons, Hong Kong 989 tons, Siam 689 tons, while the United Kingdom took 3,758 tons and the Continent of Europe 1,555 tons. This trade is worthy of every possible encouragement as providing outlets for Malayan produce which are of particular value while the market for copra is so unfavourable and uncertain.

The net export from Malaya of oil cakes (most of which is probably coconut oil cake, "poonac") was the highest on record and reflects the increase in coconut oil production. The net exports in 1934 were 11,273 tons, valued at \$323,511 as compared with 9,993 tons, valued at \$269,985 in 1933 and 2,773 tons, valued at \$84,777 in 1932.

Areas.—The last coconut census was taken in 1930. The present figures are based on that year with such amendments as have been reported from time to time. The total area is estimated to be 610,696 acres, of which 242,758 acres are in the Federated Malay States, 83,400 acres in the Straits Settlements and 284,538 acres in the Unfederated Malay States. Of this total, 489,882 acres, or 80 per cent. are contained on holdings of less than 100 acres each—in most cases of areas of less than 10 acres each. There are 62 estates of over 100 acres each, with a total planted acreage of 120,814 acres.

Table I.
Estimated Planted Area of Coconuts at end of 1934.

State or Territory		On holdings 100 acres or over	On holdings of under 100 acres	Total
Perak	...	49,464	59,800	109,264
Selangor	...	37,827	72,539	110,366
Negri Sembilan	...	1,069	4,897	5,966
Pahang	...	2,712	14,450	17,162
Total F.M.S.	...	91,072	151,686	242,758
Singapore	...	3,159	5,241	8,400
Malacca	...	—	13,228	13,228
Dindings	...	2,657	3,933	6,530
Province Wellesley	...	17,598	19,223	36,821
Penang	...	2,175	11,375	13,550
Labuan	...	—	3,422	3,422
Brunei	...	—	1,370	1,370
Christmas Island	...	—	19	19
Total S.S.	...	25,589	57,811	83,400
Johore	...	3,300	166,067	169,367
Kedah	...	853	28,218	29,071
Perlis	...	—	3,829	3,829
Kelantan	...	—	57,271	57,271
Trengganu	...	—	25,000	25,000
Total U.M.S.	...	4,153	280,385	284,538
TOTAL MALAYA	...	120,814	489,882	610,696

Oil Palms.

Prices.—PALM OIL. The average price per ton of Malayan palm oil in bulk c.i.f. Liverpool, on a basis of 18 per cent. free fatty acids for the year 1934 was £12.9.3, as compared with an average price of £16.0.3 in 1933. The average c.i.f. New York/Philadelphia price in 1934 was 2.45 cents gold per lb. The average price in January 1934 was £14.6.8 on a falling market, the price declining steadily until in June an average price of £8.18.9 per ton was reached. Thereafter the price appreciated, until at the end of the year a price of £16 per ton was reached.

PALM KERNELS. The average price per ton of Malayan palm kernels, fair average quality, c.i.f. landed weight on the Continent, in respect of the year 1934 was £6.12.8. The corresponding price in 1933 was £8.8.6 per ton.

Production.—The following table shows the actual Malayan production of palm oil and kernels in Malaya, as declared by estates.

Table 2.
Malayan Production of Palm Oil and Kernels 1934.

State	Palm Oil	Palm Kernels
Perak ...	tons 5,378.1	tons 740.0
Selangor ...	7,362.5	1,253.5
Negri Sembilan ...	192.5	19.9
Pahang ...	31.5	nil
Johore ...	4,510.5	794.9
Total Malaya ...	17,475.1	2,808.3

In the year 1933, the production of palm oil was 12,998 tons and of palm kernels 2,298 tons.

Exports.—The imports into Malaya of palm oil in 1934 amounted to 127 tons, valued at \$13,328, exports were 15,979 tons valued at \$1,378,475; net exports were therefore 15,852 tons, valued at \$1,365,147, as compared with 12,100 tons in 1933, valued at \$1,363,532. Of the 1934 exports, 7,640 tons were consigned to the United Kingdom, and 5,727 tons to British Possessions and Protectorates.

The net exports of palm kernels in 1934 were 3,196 tons, valued at \$167,549, imports into Malaya being negligible. Of these exports, 2,107 tons were consigned to the Continent of Europe and 1,023 tons to the United Kingdom. In the previous year, the net exports of kernels were 2,019 tons, valued at \$150,871.

The peak production month in each of the last three years was August, while a smaller peak month in each year occurs in March. May and June are the months of lowest production.

Areas.—At the end of 1934 there were thirty-three oil palm estates in Malaya, with a total planted area of 64,605 acres, and 44,883 acres of reserve land. During 1934, 1,080 acres were planted. Of the total planted area, 31,629 acres of palms, or about half of the total area, were planted up to the end of 1929, and can therefore be said to have reached the bearing stage, though not, of course, necessarily the stage of maximum production. The sizes of estates were as follows:—ten estates of over 2,000 acres planted, four estates of between 1,000 and 2,000 acres planted, nine estates of between 500 and 1,000 acres and ten estates of under 500. There are twenty-two factories for the preparation of palm oil and kernels, of which all but three are of the centrifugal type. The Central Experiment Station, Serdang, has both centrifugal and press machinery.

Imported Vegetable Oils.

Local consumption of edible oils is considerable. The following figures* include all the important products of this description in which imports exceed exports.

Table 3.
Net Imports of Vegetable-Oil Products 1934.

Products		Net Imports Tons	Value Net Imports \$
Groundnuts	...	14,357	1,069,836
Groundnut oil	...	6,113	1,211,564
Soya beans	...	17,335	894,731
Gingelly	...	2,880	246,246
Gingelly oil	...	27	6,512
Castor oil	...	76	21,944

* Abstracted from Malayan Annual Summary of Monthly Returns of Foreign Imports, Exports and Shipping for the year ending 31st December, 1934.

Groundnuts and groundnut oil are chiefly used for culinary purposes, especially by the Chinese. Most of the nuts are imported from the Netherlands Indies, while the oil is imported from the Netherlands Indies (Java) and China in about equal quantities.

Net imports of groundnuts in 1933 were 11,739 tons, valued at \$1,000,259. The 1934 net imports easily constitute a record, net imports in years previous to 1933 being from 5,000 to 8,000 tons annually. On the other hand, net imports of groundnut oil have decreased and in the year under review were the lowest on record, being 6,113 tons, as compared with 6,885 tons in 1933, 9,288 tons in 1932 and 13,291 tons in 1931.

The increased imports of groundnuts and the decreased imports of groundnut oil are ascribed to the effect of the tariff on these products. There has been an increased use of groundnuts in oil-crushing factories, especially in the Straits Settlements, due to the fact that whereas the Federated Malay States are subject to an import duty on groundnuts of $1\frac{1}{2}$ cents per lb. full duty and $\frac{3}{4}$ cent preferential duty, and of 6 cents per lb. on groundnut oil and 3 cents preferential duty, there are no import duties in the Straits Settlements on either groundnuts or their oil. Crushers in the Straits Settlements are therefore able to purchase groundnuts from the cheapest source—usually outside the Empire—and to import the oil into the Federated Malay States as Empire production. Of the gross imports of groundnuts into Malaya in 1934, 4,040 tons were from British Possessions and 11,076 tons from foreign countries.

The known area of groundnuts in Malaya is 1,651 acres, of which 654 acres are in the Federated Malay States, 32 acres in the Straits Settlements and 965 acres in the Unfederated Malay States (595 acres in Johore and 350 acres in Kedah). Doubtless there are other areas, as the crop is frequently grown in small areas on newly-opened land, or in rotation with other crops, in market gardens.

Soya beans are imported in large quantities, entirely from China. They are used locally in the manufacture of sauces.

Gingelly is imported mainly from Java. Its oil is expressed locally by Indians who use it in cooking and for anointing the body.

It is to be noted that all the above-mentioned crops are derived from tropical regions, although for economic reasons, their cultivation in Malaya is not pursued on any considerable scale. Soya beans have occasionally been grown successfully in this country generally by Chinese market gardeners. Yields have, however, been exceedingly variable.

Balance of Trade in Vegetable-Oil Products.

In 1934, the value of the net exports of coconut and oil palm products was \$9,909,938, as compared with \$13,090,254 in 1933. The value of net imports of other vegetable-oil products in 1934 was \$3,450,833 as compared with \$3,548,039 in 1933. On balance, therefore, the value of exports exceeded those of imports by \$6,459,105 in 1934 as compared with \$9,542,215 in 1933.

Market prices in 1935 of vegetable oils shew a marked improvement on those of 1934. The imports and exports of these products for the first quarter 1935 are shewn in the following table and indicate a material recovery of these markets from the trade depression of 1934. The value of exports for the quarter exceeds that of imports by \$2,592,460.

Table 4.
Value of Malayan Exports and Imports of Principal
Vegetable-Oil Products.

(First Quarter, 1935).

Product		Value of Exports \$	Value of Imports \$
Coconut products	...	4,924,088	1,696,761
Oil palm products	...	438,613	4,414
Gingelly products	...	82,782	840,059
Soya beans	...	7,859	273,957
Gingelly products	...	7,642	53,333

Abstract.

TWENTY-FIRST REPORT ON NATIVE RUBBER CULTIVATION IN THE NETHERLANDS INDIES.*

Fourth Quarter 1934.

The exports of native rubber during the first two months of the quarter under review were small, attributable to the small production resulting from lower prices in the interior, whereas the accumulation of stocks, particularly in Bandjermasin, Palembang and Djambi, has also been of great significance. Part of these stocks was cleared in the second half of December in consequence of the legal regulation limiting stocks, which was made effective on December 16th, and to the fact that on the same date the extra export tax was reduced from 20 cents† to 16 cents per kgm.

As a result of the small amount exported in October and November, the excess of native exports over the quota was considerably reduced, and at the end of the year amounted to 8,593 tons†. The reduction of the export tax in December again stimulated production.

The changes which have been instituted in the conversion percentages of wet rubber to dry rubber were stated in the last report; in addition to these, the conversion percentage for wet rubber exported from Palembang was raised from 82½ to 85, as from 16th December.

The percentage of native rubber exported as dry rubber (blanket, smoked sheet and sheety crêpe) improved from 35½ in October to 44 in November, and 46½ in December. The exports of scrap and earth rubber declined slightly.

Propaganda for the production of native smoked sheet was continued and extended in the regions of Palembang, Djambi, Southern and Eastern Division of Borneo and the East Coast of Sumatra, under the leadership of experts especially appointed for the purpose.

Due to the increased production of dry rubber by the natives and the greater uniformity in the quality of wet rubber, it is now possible to give price data which are more valuable than the prices reported previously, which principally referred to qualities of wet rubber of which the washing loss percentage formed a somewhat uncertain factor. In the following table, the prices for the Western Division of Borneo, Banka, Tapanuli and Palembang have been included together with the respective prices for Java standard sheet in Batavia, less the extra export tax on dry native rubber (column 2) for comparative purposes.

The use of the special export tax for the advantage of the rubber producing natives has been extended. As the planning of the projects to be undertaken progressed, the number of demands for any funds available also increased. At the end of 1934 a total of 3.8 million guilders was made available. A number of the larger projects are now under way.

* Abstracted from *The Netherlands Indies* Vol. III, No. 6, March 16, 1935.

† Throughout this Abstract, cents refer to guilder cents and tons to metric tons.

Prices of Native Rubber in guilders per 100 kilograms.

Date		Western division of Borneo			Bangka	Tapanoeli	Palembang	
		Pontianak	Singka-wang	Beng-kajang	Pangkalp-inang	Sibolga	Palembang	
		slabs	sm. sh.	sm. sh.	sm. sh.	Sheety crepe No. 10	slabs	sm. sh.
Oct.	3	23	9.30	14.10	17.80	10.50	9.60	—
"	10	19½	8.10	11.50	11.35			
"	17	21¼	8.10	13.75	13.75		8.00	—
"	24	21¾	7.40	12.45	11.35			
"	31	20¾	6.90	12.15	—			
Nov.	7	18½	5.05	10.55	12.95	5.80	7.20	—
"	14	19¼	5.05	10.55	11.35			
"	21	18	5.45	9.70	10.95		7.20	—
"	28	19	—	10.55	9.70			
Dec.	5	18½	6.70	8.95	9.05	10.90	7.20	14.40
"	12	18	6.30	8.90	8.90			
"	19	22¼	8.70	11.80	9.70		9.20	15.00
"	26	—	8.30	12.15	11.35			

Local reports are concerned mainly with the quantity of rubber exported from each locality and prices obtained. The following are some of the main matters of interest. In December the first lot of native-smoked sheet appeared on the Palembang market. Up to the end of December, 706 rubber mangles had been shipped to the interior, some 600 of them in the month of December. Seventy hand mangles were imported into Djambi in the fourth quarter of 1934 as compared with 200 in the third quarter.

The tree census in Banka and Dependencies was completed in October. The number of trees was 13,636,360 of which 6,243,726 were tappable and 7,392,634 not tappable. About 10 per cent. of tappable trees had never been in production. The total number of plantation owners is 25,183, of whom 19,460 have 30 or more tappable trees.

The latter group comprises 2,367 Chinese and 17,093 native rubber planters. For practical reasons owners of less than 30 tappable rubber trees were not considered as producers for application of the individual restriction to be instituted; they will, however, be given an opportunity of forming combines, and may request a harvesting licence for these joint plantings, providing the total number then reaches more than 30 tappable trees. But this group consists of only 1,359 tree-owners with a total of 22,428 tappable trees, and is unimportant.

By decree of the Director of Internal Administration (Dir. B.B.) dated December 20, 1934 No. BR 8c/1/15 the export quota of the region of Banka and Dependencies for the first licensing period (January up to and including

March) of the restriction year 1935 was fixed at 254,148 kgms. of dry rubber. The basic production per tappable tree is 0.217 kgms.

The establishment of small factories for the manufacture of native smoked sheet was started in the Southern and Eastern Division of North Borneo. Several credits of about £400 were granted for the installation of complete machinery. The number of these small factories which produce marketable smoked sheet from native latex is now considerably increasing.

According to the final figures of the tree census in the Free Region of the Residency of Rhio and Dependencies, the total number of rubber trees in this region is 13,022,908, of which 4,151,102 are tappable and already tapped, 3,598,910 tappable but never tapped, and 5,272,896 not tappable.

The basic production per tappable tapped tree is 0.771 kgm. An allotment of a quarter of this amount is allowed for trees tappable but not yet tapped.

The number of owners of tappable plantations was 8,956.

Additional information for January and February is given at the end of the Report.

The exports of native rubber totalled 9,790 and 17,156 tons during January and February respectively. Stocks held by recognised exporters at the end of December 1934 were 16,932 tons; they decreased to 13,554 tons at the end of January 1935 and 8,294 tons at the end of February.

Effective January 1, 1935, an individual restriction was introduced in Banka and Dependencies and the Free Area of Rhio. In Acheen and Dependencies, the Residency of Tapanoei and Sumatra's East Coast (except Bengkalis), the individual restriction was introduced as from April 1, 1935.

The registration of the rubber trees in North Sumatra (Acheen and Dependencies, Tapanoei and Sumatra's East Coast, except Bengkalis) gave the results shown in the following table.

Department	Number of Producers	Tappable Trees		Total number of Trees
		Tapped	Untapped	
Acheen and Dependencies	5,688	1,898,766	1,485,166	—
Tapanuli	43,885*	10,264,762	6,480,659	32,886,602
Sumatra's East Coast (Est. area)	39,771	13,830,000	6,530,000	32,219,003

* Excluding 12,222 owners of untappable trees.

For 1935 the regional quotas for these three regions have been fixed at 0.43, 5.59 and 3.38 per cent. respectively of the basic export quota of native rubber in 1935.

Except in Banka and Dependencies, an allotment of one quarter of the quota for the tappable trees is allowed for the trees tappable but never yet tapped.

The basic quota per tappable tapped tree is 0.23 kgm. per year for Banka and Dependencies, 0.77 kgm. for the Rhio free region, 0.32 kgm. for Acheen and Dependencies, 0.35 kgm. for Tapanoeli and 0.61 kgm. for Sumatra's East Coast excluding Bengkalis.

In conclusion, reference might be made here to the announcement of the Government in the meetings of the Volksraad of February 14 and 16, 1935, regarding the operation of rubber restriction during the first restriction year, a review of which has been given in *The Netherlands Indies* Vol. III, No. 4. It was there explained in a convincing manner that the advantages of restriction for the Netherlands Indies as a whole, as well as for the estates and native rubber producing districts more specifically, were clearly demonstrated shortly after the introduction of the restriction; that practice had shown that the special export tax on native rubber could be considered as an effective restriction measure; that the Government had had the native rubber production always sufficiently in hand; and that means were being sought to relieve as far as possible the undeniable grievances which will always remain attached to the export tax as a restriction measure.

Review.

Empire Fibres for Marine Cordage.

Imperial Institute, London. 11 pp. February, 1935.

This pamphlet is a brief report, fully supported by data, of tests of tarred and untarred cordage made from East African sisal. The Director of the Imperial Institute, in a covering letter summarises the report in question and the work of the Admiralty and the Institute which has led to the present conclusions. He states:—

"The possibility of employing Empire fibres as substitutes for Manila hemp for the manufacture of marine cordage has been the subject of investigation by the Admiralty and the Imperial Institute for the past ten years, and the results of the trials hitherto completed have been published in the Institute's Bulletin. As an outcome of these trials the Admiralty have arranged for the partial adoption in the Service of ropes made of Empire fibres—Sisal from East Africa and Phormium fibre from New Zealand—in place of Manila ropes.

In the present report an account is given of a further series of experiments which have been carried out by the Admiralty to investigate the effect of tarring on the durability of Sisal rope when exposed to the action of sea-water. A considerable amount of tarred cordage is employed for marine purposes and, as Manila hemp does not absorb the tar satisfactorily, such cordage is at present generally made of European hemp. The tests with Sisal have now shown that this fibre absorbs tar well and that the tarred rope is quite suitable for marine use.

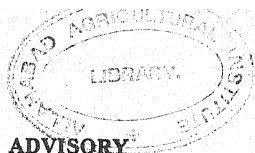
Ropes, three inches in circumference, were prepared from No. 1 East African Sisal, one batch being made in the ordinary way from untreated fibre and another from yarn which had been passed through a bath of Archangel tar. Both kinds of rope were exposed to the action of sea-water for periods of two, four, six and nine months, their breaking strain being determined at the end of each period. It was found that after exposure to the action of sea-water for nine months the untarred Sisal rope had lost 76 per cent. of its initial strength, whereas the strength of the tarred Sisal rope had fallen only 29 per cent.

The tests have thus shown that the life of Sisal ropes when exposed to sea-water is enormously prolonged by tarring. The Admiralty are therefore considering the general adoption of tarred Sisal cordage in lieu of tarred European hemp cordage, and enquiries are being made as to the extent to which such substitution could be carried out.

It is hoped that the new and extended use of Sisal indicated by this investigation will lead to an increased demand for this important Empire fibre."

Departmental.

MEETING OF THE AGRICULTURAL ADVISORY COMMITTEE.



A number of important subjects were discussed at the meeting of the Agricultural Advisory Committee held at the Department of Agriculture, Kuala Lumpur, on 16th April, 1935. The following is a resumé of the more important points dealt with.

COCONUTS.—Further examination was made of the recommendations contained in the report of the Vegetable Oils Committee, and a review given of action already taken. In this connexion, the Committee dealt with a diversity of points, including the future of copra research in Malaya, hydro-generation of oils, blending of foreign with local copra, sale of coconuts to estate labourers, and other means of extending the market for coconut products. The improvement of Malayan copra and the likelihood of the improved product finding recognition on the market engaged the attention of the Committee, which recognised that there is need of a representative body of copra producers in order that the latter should be in a position to discuss the requirements of the industry with authority. Mr. Stanton gave details of the proposed coconut section of the United Planting Association of Malaya, which would be in a position to represent the industry. The following resolution was carried unanimously:—

“The Agricultural Advisory Committee has considered the information that has been laid before its members concerning the prospects for the establishment of a super grade for Malayan copra.

The Committee is of opinion that this information is of great importance and merits the most serious consideration of the industry.

It recommends that the information should be laid before the industry and that the industry should, if possible, discuss at an early date the practicability of implementing proposals for the establishment of a super grade of copra”.

PINEAPPLES.—The Committee reviewed the progress made for the better organization of the Malayan pineapple industry. The Chairman informed the meeting that a Despatch had been sent to the Secretary of State to the effect that the Malayan Governments accept the offer of a grant from the Colonial Development Fund towards the scheme for research on canning, not exceeding £2,625, to be spread over three years and agree to divide the balance of expenditure to be met by Malayan Government in the ratio of 3 F.M.S., 12 Johore and 10 S.S. A request has been made for the recruitment of a suitable Research Chemist from England.

RICE INDUSTRY.—The Chairman reviewed the present position of the industry in Malaya, and the methods of improvement which are being actively pursued. The Committee was informed of the approval of the appointments

of an Assistant Chemist, Assistant Botanist and Assistant Entomologist as research officers on rice. The general programme of work suggested was approved.

RUBBER.—Subjects discussed under this head included the work of Asiatic Rubber Instructors, mouldy rot disease, coagulants, Malayan rubber competition, and smoke houses for small-holders.

POULTRY.—The proposals for the establishment of a Central Poultry Breeding Station to be attached to the School of Agriculture, Serdang, were discussed. The Committee was in agreement with the proposals.

PALM OIL.—The Committee reviewed recent progress of research work in the Department on this product.

FRUIT.—The desirability of extending the work of the Department on fruit culture was discussed and the Committee passed a resolution expressing the view :—

“That more extensive work on the improvement of fruit cultivation and the distribution of planting materials of improved varieties of fruit trees should be undertaken”.

LABORATORY ACCOMMODATION.—The Chairman informed the meeting that the proposal for the creation of new laboratory accommodation for the Department of Agriculture could not be provided by Government on the Estimates for 1935 owing to the financial position, but that provisional entry had been made in the P.W.D. Budget for 1936 for the erection of new mycological, entomological, soils and chemical laboratories. It was not yet known whether these proposals would be accepted by Government. A plan shewing the proposed lay-out of the buildings was tabled.

A resolution was adopted unanimously in which the Committee drew attention to the inadequacy of the existing accommodation and pointed out that the fullest benefit of the work undertaken by the Department could not be expected when scientific workers labour, as they do at present, under unsuitable conditions. It urged that favourable consideration be given to the present proposals, which are reasonable and opportune.

FROM THE DISTRICTS.

Compiled by the Chief Field Officer from Monthly Reports submitted by Field Officers.

May, 1935.

The Weather.

In Kedah the weather during May, usually a wet month, was normal. In Province Wellesley and all the inland portion of the Peninsula except the centre and south of Johore, the weather was hot and dry and the rainfall up to the 24th May was below average, being in some places markedly deficient. On the western coastal plain in the Panchang Bedina area of Kuala Selangor District less than 1 inch of rain was recorded. With this exception rainfall on the west coast in Perak, Selangor and Negri Sembilan was about the average, but southward in Malacca and Johore it was higher and in the Batu Pahat District was more than twice the normal figure. On the south coast of Johore and in Singapore Island it was also somewhat wetter than usual. On the east coast in Kelantan conditions were very abnormal, heavy evening storms causing a high precipitation. On the Pahang coast, however, the rainfall was normal, while on the east coast of Johore it was deficient.

Remarks on Crops.

Rubber.—The principal feature of the month has been the increase in the number of holdings left untapped in almost all parts of the country. Four causes for this increase were given by Field Officers. The first was the recent reduction in the number of coupons issued in conformity with the increased percentage of restriction. Two others were the prior occupation of peasant proprietors in padi planting and in collecting the early and fairly plentiful fruit harvest. The fourth cause was the sale of coupons; these could be disposed of for \$13 to \$14 per picul of export rights. The cost of production of un-smoked sheet, if hired labour is employed, is from \$8 to \$9 per picul. Prices for this sheet have ranged mostly between \$20.50 and \$22 per picul; consequently the sale of coupons was as profitable as tapping the trees, if the owner was unable or unwilling to do the work himself.

A cabinet for smoking rubber sheet from small holdings, to which reference was made on page 194 of the April number of this Journal, was erected and demonstrated at the Raub District Agricultural Show on May 6th. Another has been put up at the Central Experiment Station, Kota Bahru, Kelantan, for purposes of demonstration and as part of the Department exhibit at the State Agricultural Show to be held in June.

Padi.—Padi harvest was completed in Larut District of Perak and the coastal mukims of Pahang, but estimates of the crop are not yet available. It was also finished in the Sungei Manik area of Lower Perak District where the average crop is reported to have been of the order of 300 gantangs per acre, although in some localities yields of about 600 gantangs were obtained.

In the Panchang Bedina area harvest commenced and fair yields were anticipated except from an area of about 1,000 acres which for some reason had not even begun to flower. The State Agricultural Officer visited this area to investigate the cause of this condition which he found to be associated with the presence of very numerous stem borers in the padi plant of certain varieties, notably Radins.

Work on the preparation of land and sowing of nurseries commenced in Kedah, Krian, parts of Malacca and the Muar and Mersing Districts of Johore. Ploughing was begun in the North and Central Districts of Province Wellesley, but had to be stopped owing to lack of water. In the river mukims of Western and Southern Pahang transplanting was in progress, but was somewhat late because the first nurseries had been damaged by drought, while the weed growth in the fields was heavy owing to lack of water. In Kelantan the rain enabled the first ploughing for dry padi to be commenced much earlier than usual, but unless the weather becomes drier it will be difficult to put the land into a fit state for planting.

In Malacca 120.69 piculs of padi seed of nine pure strains were sold to growers in the Settlement. In order to make up a deficiency, 1,500 gantangs of seed padi were obtained for Muar District from selected cultivators in Malacca and 500 gantangs of Seraup 48 for Endau District of Johore from Perak. In the Krian District 725 gantangs of selected padi seed, mostly Seraup 48, were distributed and a further 1,100 gantangs of Radin 2 were made available for the riverine mukims of Lower Perak where last year's crop failed. From Kedah 100 gantangs of the variety Padi Chubai, resistant to brackish water, were supplied for planting in Kelantan, while 150 gantangs of locally grown seed, mostly Siam 29, were also distributed in that State.

The Government Rice Mill at Temerloh had to be closed down on May 23rd because supplies of grain were insufficient owing to local difficulties of transport rather than to lack of surplus stocks in the District. Further supplies are, however, gradually being obtained and the mill will be re-opened when sufficient of these have been accumulated.

Copra.—There was a further slight improvement in the price of copra, so that the revival of interest in its production was maintained. One new approved type of kiln commenced operations in Province Wellesley and another in Krian, while two were opened in Tioman Island off the east coast. The product of the Tioman kilns sold for satisfactory prices in Mersing.

There is stated to be a demand for supplies of fresh nuts and copra for the oil mill at Kuala Sungei Baru in Malacca.

Pineapples.—Heavy crops of fruit were harvested in Singapore Island and in the Kuala Langat District of Selangor. The Kundang factory in the latter District was working night and day. In Ulu Langat District some 450 acres of pineapples were also in bearing, the fruit being conveyed to the Klang factory. In Johore supplies were adequate to meet factory requirements.

Recent observations show that, with the present wide spacing of pineapples grown as a sole crop, soil erosion proceeds rapidly and causes heavy losses of top soil. It is evident that this matter requires early attention if the fertility of many of the areas now carrying pineapples is to be preserved.

Fruit.—The mid-year season for tree fruits commenced somewhat earlier and more uniformly than usual. There was a good crop of durians and mangosteens in most parts of the Peninsula, but the durian crop was only moderate in Malacca and small in Pahang. Rambutans were plentiful, except in the inland districts of Pahang, where the trees were flowering, and in Johore where the crop was ripening. In Kelantan the durian crop was much earlier than usual, but in Singapore Island tree fruits in general were not quite ripe. Other tree fruits were in season in some areas, such as pulasan, langsats, rambai, mata kuching, the mango group and chempedak. There were large transfers of fruit from the producing districts to all the principal towns. Prices for durians varied considerably according to quality and locality, from 3 cents each in the north to as much as 40 cents each in Pahang. Mangosteens sold at 10 to 15 cents a hundred in Province Wellesley and Krian, but elsewhere at 30 to 85 cents a hundred, while rambutans fetched 25 to 60 cents a hundred.

Tobacco.—Additional small scattered plots of tobacco were planted in Kedah and in Central Perak. Crops were harvested in Province Wellesley, where 20 piculs were sold, in Perak South and in Malacca. In Southern Perak the new supplies caused a marked fall in prices, which for first quality leaf were \$40 to \$60 per picul as compared with \$50 to \$80 in the previous month. Elsewhere prices showed little change.

Agricultural Stations and Padi Test Plots.

At the Pineapple Experiment Station in Singapore Island rambutan seedlings were successfully budded. It was also found that the propagation of rambutans and pulasan by the "etiolated shoot" method was much stimulated if the beds were shaded.

On that part of the Central Experiment Station in Kelantan allotted to dry land plants a number of permanent crops were planted. Ploughing was commenced in the dry padi area. At the Telok Datoh Station in Selangor lalang eradication was finished and a mixed cover of *Calopogonium mucunoides* and *Centrosema pubescens* was sown with a dressing of 1 cwt of basic slag per acre.

The padi harvest was completed at the Kilanas Station and almost finished on the Lumapas Test Plot in Brunei.

Work on preparation of the land and sowing nurseries for the coming season was commenced on the Pekan, Dong and Lipis Padi Test Plots in Pahang, the Kendong Plot in Negri Sembilan, Titi Serong Station and the Kuala Kurau Plot in Krian, and the Telok Chengai Station and all Test Plots in Kedah. At the Temerloh Plot in Pahang transplanting was commenced.

Agricultural Shows and District Padi Competitions.

A district padi competition was held at Balik Pulau, Penang on May 19th. There were 47 exhibits, all of good quality. Mukim padi competitions were held in Ulu Selangor District in preparation for the District Show which is to take place early in June.

On May 6th a successful District Agricultural Show was held at Raub in Pahang at which the twelve best padi exhibits from four mukim competitions were judged. A short account of this Show appears elsewhere in this number.

Three mukim padi competitions were held in Lipis District and two in Temerloh District during the month. In the former District there were in all 223 entries of which most were not quite up to the standard required owing to the presence of mixed varieties of grain, or of red grain. In the latter District there were 559 exhibits; the competitions were well attended in both mukims and roused much interest.

In Negri Sembilan mukim competitions in Kuala Pilah District completed the State competitions for the season. The total number of exhibits in the State was 1,168 or about half the number judged in 1934, but the quality showed considerable improvement.

In Malacca a successful District Agricultural Show was held at Jasin on May 7th and the Central District padi competition took place on May 11th.

Rural Lecture Caravan.

The tour of the Caravan in Krian District which commenced on April 25th terminated on May 2nd and proved quite successful. On May 23rd a tour was begun in Penang and Province Wellesley which attracted large audiences at the four centres that had been visited by the end of the month.

Fish.

The Director of Fisheries supplied from Singapore 100 carp fry in a sealed container for stocking a pond owned by the headman of the mukim of Panji in Kelantan. These arrived safely, only two having died on the journey. The special method of packing these fry developed by the Department of Fisheries has proved very successful on previous occasions.

As a result of the assistance given by the Fisheries Department in preparing ponds and obtaining fry, the rearing of carp and also of local fish is attracting the attention of Malays in several parts of the country, whereas in the past carp rearing has been conducted entirely by Chinese. For feeding carp a supply of guinea grass is useful and owners of ponds are encouraged by the staff of the Department of Agriculture to establish plots of this grass.

It is of interest to record that trout fry have arrived at Cameron Highlands and are being reared by the Director of Fisheries in a special trough supplied with running water.

DEPARTMENTAL NOTES.

Visits of the Adviser on Agriculture.

The Adviser on Agriculture visited Negri Sembilan on May 15th and 16th, inspected the Agricultural and Test Stations in that State and discussed various matters with the State Agricultural Officer.

He visited Singapore and Johore from 21st to 24th May. On the 22nd he visited the new pineapple factory of Lee Pineapple Company in Johore as well as other factories and cultivated areas. In the evening he delivered a lecture, illustrated with lantern slides, in the hall of the Raffles Institution, to the pineapple trade, on *The British Fruit Canning Industry*.

The Adviser attended to several interviews on the 23rd and also presided at a joint meeting of the Pineapple Advisory Committees of Singapore, Johore and Selangor.

Lecture on the British Fruit Canning Industry.

On Wednesday May 22nd the Adviser on Agriculture, Dr. H. A. Tempany, C.B.E., delivered a lecture on *The British Fruit Canning Industry*, to a meeting of officials and representatives of the packing and exporting branches of the Malayan canned pineapple trade in the hall of the Raffles Institution at 8 p.m.

The Chair was taken by Mr. J. Innes Miller, M.C.S., Registrar-General of Statistics and Registrar of Factories and Marks under the Pineapple Industry Ordinance; among those present were the Hon'ble Sir A. Caldecott, M.C.S., C.M.G., C.B.E., Colonial Secretary, and the Hon'ble Mr. W. E. Pepys, General Adviser, Johore, together with other officials, representatives of the Chamber of Commerce, the Chinese Chamber of Commerce, the Pineapple Packers' Association, the Pineapple Growers' Association, and a number of gentlemen representing packing and export firms.

In the course of his lecture, which was illustrated by lantern slides, Dr. Tempany described and discussed the position of the English canning industry with special reference to the pineapple industry in Malaya, indicating certain directions in which improvements in the Malayan industry were needed to bring it up to date.

The lecture which was closely followed by all present concluded with a vote of thanks to the lecturer.

Leave.

Mr. J. N. Milsum, Senior Assistant Agriculturist, has been granted 9 months and 20 days' full-pay leave from 16th May, 1935 to 6th March, 1936.

Mr. F. Birkinshaw, State Agricultural Officer, Perak, has been granted 8 months and 4 days' full-pay leave from 3rd May, 1935 to 6th January, 1936.

Statistical. **MARKET PRICES.**

May, 1935.

Rubber :—There was a slight improvement in the rubber market during May, the price in Singapore once more passing 20 cents per lb. Spot loose opened at 19½ cents per lb., and, after falling to 18¾ cents, rose in the second half of the month to 20¾ cents, but closed at 19¾ cents. The Singapore average price for the month for No. 1. X. Rubber Smoked Sheet was 19.59 cents per lb. as compared with 18.91 cents in April. The average price in London for the month was 5.84 pence per lb., and in New York 11.96 cents gold per lb., as compared with 5.70 pence and 11.47 cents gold in April.

Prices paid for small-holders' rubber at three centres during the month are shewn in the following table.

Table I.
Weekly Prices Paid By Local Dealers for
Small-Holders' Rubber, May, 1935.

(Dollars per Picul.)

Grades.	Kuala Pilah, Negri Sembilan.					Kuala Kangsar, Perak.				Batu Pahat, Johore.		
	2	9	16	23	30	1	15	22	29	1	8	15
Smoked sheet	23.13	22.51			24.70	22.50	22.49	23.90			20.67	22.75
Unsmoked sheet	21.00	21.21	21.39	21.74	22.00	20.00	21.00		22.50	19.00	20.00	21.50
Scrap	16.00											

Transport by lorry Kuala Pilah to Seremban 15 cents per picul, to Malacca excluding duty, 25 cents per picul, by rail Seremban to Penang \$1.24 per picul, Seremban to Singapore \$3.00 per ton.

Transport from Batu Pahat to Singapore by lorry excluding duty, 90 cents per picul.

Transport from Kuala Kangsar to Prai by railway \$6.20 per ton.

Transport from Kuala Kangsar to Singapore by railway \$10.00 per ton (minimum consignment 5 tons).

At Kuala Pilah the standard deduction for moisture in unsmoked sheet is 5 per cent.

At Kuala Kangsar the standard deduction for moisture in unsmoked sheet is 10 per cent

No purchases at Kuala Kangsar on 8th May and at Batu Pahat on the 22nd and 29th May 1935.

Palm Oil.—Prices improved during the month, and the following table shews the movement of the market for the Malayan commodities.

Table II.
Prices of Palm Oil and Palm Kernels.

Date 1935.	Palm Oil in Bulk, c.i.f. landed weight Liverpool/ Halifax.	Palm Kernels, c.i.f. landed weight London/ Continent
May 3	per ton £ 20. 10. 0	per ton £ 9. 5. 0
„ 10	22. 0. 0	9. 10. 0
„ 17	22. 0. 0	9. 5. 0
„ 24	22. 0. 0	9. 0. 0

Copra.—The market continued to improve steadily in the first half of the month but weakened at the close. The sun-dried grade opened in Singapore at \$4.90 per picul, rose to \$5.05, and closed at \$4.70, the average for the month being \$4.87 per picul as compared with \$4.57 in April. The mixed quality averaged \$4.53 per picul as against \$4.32 in the previous month.

Copra cake improved from \$1.15 to \$1.25, averaging \$1.23 for the month.

Rice.—The average wholesale prices of rice per picul in Singapore during April were as follows:—Siam No. 2 (ordinary) \$3.97, Rangoon No. 1 \$3.41, Saigon No. 1 \$3.87, as compared with \$3.77, \$3.43 and \$3.55 in March. Corresponding prices in April 1934 were \$2.54, \$2.35 and \$2.57.

The average retail market prices in cents per gantang of No. 2 Siam rice in April were:—Singapore 28, Penang 20, Malacca 26, as compared with 27, 20 and 24 respectively in March.

Padi.—Prices per gantang ranged from 5 to 14 cents in different parts of the country. The Government Rice Mill, Bagan Serai, paid \$1.90 per picul for padi, and the privately owned mill at Parit Buntar was reported to be paying \$2.25.

Tea.—Consignments of tea from four Malayan estates were sold on the London market during May. The highland tea sold at prices ranging from 11d. to 1s. 0½d. per lb. and the lowland tea averaged 10½d. and 10¾d. per lb.

Average London prices per lb. paid during May for tea consignments from other countries were as follows:—Ceylon 1s. 3.53d., Java 10.17d., Indian

Northern 11.86d., Indian Southern 1s. 1.90d., Sumatra 9.02d. The latest London prices available are for the 23rd May and the above averages are accordingly up to that date only.

The following are the latest Colombo average prices available and are quoted from the *Weekly Tea Market Report*, 28th May, 1935, of the Colombo Brokers' Association; prices are in rupee cents per lb.: High Grown Teas 65 cents, Medium Grown Teas 58 cents, Low Grown Teas 54 cents.

Tuba Root (Derris).—Supplies of good quality roots sold on a basis of rotenone content were still scarce in Singapore in May, and the price advanced to \$53 per picul, as compared with \$50 in April. Roots sold on a basis of ether extract also advanced in price to \$42 per picul as compared with \$40 in the previous month. Non-Malayan roots continued at \$32 per picul.

Coffee.—Prices in Singapore were considerably lower in May. Sourabaya coffee opened at \$15 to \$16 per picul, but fell throughout the month to close at \$14 to \$15. Palembang coffee averaged \$11.25 per picul as compared with \$11.19 in April.

Local prices for coffee continued low, falling to \$18 per picul in Perak Central, but in Johore the price rose to \$32.

Aracanuts.—Singapore average prices per picul during May were:—Splits \$3.71 to \$5.39, Sliced \$6.25 to \$8.35, Red Whole \$5.20 to \$6.35, Kelantan \$5.50 to \$5.67, the price in each range depending upon quality.

The average prices per picul quoted by the Singapore Chamber of Commerce were:—Best \$5.65, Medium \$5.07, Mixed \$4.54.

Gambier.—The price of Block improved during May, being quoted at \$6 per picul as compared with \$5 per picul during April. No. 1 Cube weakened 50 cents, being quoted at \$10.50 per picul as compared with \$11 in the previous month.

Pineapples.—Prices in Singapore per case remain fixed by the Packers' Combine as follows:—Cubes \$3.25, Sliced Flat \$3.15, Sliced Tall \$3.40.

Prices for fresh fruit fell during May; they were:—Singapore, \$1.70 per 100 for large and \$1.30 for small fruits; Johore, 1st quality \$1.50 to \$2.50, 2nd quality \$1 to \$1.80, 3rd quality 50 cents to \$1.30; Selangor, 70 cents to \$1.50 according to quality.

Tapioca. Prices per picul in Singapore remained unchanged during May and were: Flake Fair \$4, Seed Pearl \$5.40, Medium Pearl \$6.

Sago.—Pearl, Small Fair improved again during May, averaging \$3.93 per picul as compared with \$3.74 in April. Flour, Sarawak Fair weakened further to average \$2.24 per picul as compared with \$2.30 in the previous month.

Mace.—Siouw weakened during May, the average price in Singapore being \$93.25 per picul as against \$98.75 in April, while Amboina improved, to average \$61.25 per picul as compared with the previous month's average of \$58.50.

Nutmegs.—There was an improvement in May of \$1 per picul in the Singapore average prices of both grades of nutmegs, 110's averaging \$28.50 and 80's \$29.50 per picul.

Pepper.—With the exception of slight buying enquiry from Australia the market was stagnant and prices were further marked down during May. Average Singapore prices per picul were: Singapore Black \$12.44, Singapore White \$23, Muntok White \$24, as compared with \$13.75, \$26.50 and \$27.50 respectively in April.

Cloves.—Prices were further marked down in Singapore during May, but quotations were nominal. Zanzibar averaged \$34.50 per picul and Amboina \$35.50 per picul as compared with \$35 and \$37.50 respectively in April.

Cardamoms.—According to the Ceylon Chamber of Commerce weekly reports, cardamoms, green, were quoted during May at 85 rupee cents to R1.10 cents per lb. rising to 90 cents to R1.02 cents per lb. at the close of the month.

Tobacco.—There was considerable variation in local prices for tobacco. The following are representative prices per picul: Kedah \$11 to \$35; Malacca \$25 to \$30; Kelantan \$60 to \$90; Perak North \$25 to \$60 and Perak Central \$19 to \$82 according to quality.

The above prices are based on London and Singapore daily quotations for rubber; on the Singapore Chamber of Commerce Weekly Reports for the month and on other local sources of information. Palm oil reports are kindly supplied by Messrs. Guthrie & Co. Ltd., Kuala Lumpur; the Singapore prices for coffee and arecanuts by the Lianqui Trading Company of Singapore, and tuba prices by Messrs. Mackay & Co., Singapore.

1 picul = 133½ lbs. The Dollar is fixed at two shillings and four pence.

Note.—The Department of Agriculture will be pleased to assist planters in finding a market for agricultural produce. Similar assistance is also offered by the Malayan Information Agency, 57, Charing Cross, London, S.W.1.



GENERAL RICE SUMMARY*

April, 1935.

Malaya.—April imports into Malaya of foreign rice were 44,875 tons, and exports 12,952 tons, net imports being 31,923 tons. Net imports for the period January to April, 1935, totalled 144,964 tons, a decrease of 2.3 per cent. when compared with the previous year.†

Of the imports during April, 1935, 50 per cent. were consigned to Singapore, 12 per cent. to Penang, 7 per cent. to Malacca, 24 per cent. to the Federated Malay States and 7 per cent. to the Unfederated Malay States. Of the total, 61 per cent. came from Siam, 30 per cent. from Burma, 8 per cent. from French Indo-China and 1 per cent. from other countries.

Of the April exports, 68 per cent. were consigned to the Netherlands Indies and 32 per cent. to other countries. The various kinds of rice exported were as follows:—Siam 7,978 tons (61.6 per cent.), Burma 3,378 tons (26.1 per cent.), French Indo-China 345 tons (2.7 per cent.), parboiled 1,076 tons (8.3 per cent.), local production 175 tons (1.3 per cent.).

India and Burma.—Foreign exports for the first quarter of 1935 were 630,000 tons, an increase of 49.3 per cent. Of these exports 4.6 per cent. were to the United Kingdom, 9.4 per cent. to the Continent, 20.3 per cent. to Ceylon, 36.2 per cent. to the Straits Settlements and the Far East and 29.5 per cent. to other countries. The 1934 percentages were 14.7, 19.0, 24.4, 19.9, and 22 respectively.

Burma's total exports of rice and bran (*Bangkok Times*, 6th May, 1935) from 1st January to 30th March, 1935, aggregated 1,135,147 metric tons, as compared with 976,612 metric tons in 1934, an increase of 16.2 per cent.

Siam.—Exports of rice from Bangkok for the first four months of 1935 totalled 569,883 tons as compared with 578,828 tons in 1934. The 1935 figures are provisional.

Japan.—The latest information available was published in the Summary for March 1935.

French Indo-China.—Entries of padi into Cholon during the first quarter of 1935 totalled 797,461 metric tons, an increase of 76.3 per cent. Exports of rice were 580,351 metric tons, an increase of 62.5 per cent.

The Netherlands Indies.—No further information is available since the Summary for February 1935.

Ceylon.—Imports for the first four months of 1935 were 172,326 tons, an increase of 9.1 per cent. as compared with 1934. Of the 1935 imports 14.7 per cent. were from British India, 72.5 per cent. from Burma, 1.9 per cent. from the Straits Settlements, and 10.9 from other countries. The corresponding 1934 percentages were 16.8, 62.6, nil, and 20.6.

*Abridged from the Rice Summary for April 1935, compiled by the Department of Statistics, Straits Settlements and Federated Malay States.

†It is to be understood throughout the summary that all comparisons and percentage increases or decreases are in relation to the corresponding period of 1934.

Europe and America.—Shipments to Europe from the East for the period 1st January to 11th April, 1935, were 249,217 tons, a decrease of 21.6 per cent. as compared with 1934.

Of the 1935 shipments 48.4 per cent. were from Burma, 40.4 per cent. from Saigon, 8.8 per cent. from Siam, and 2.4 per cent. from Bengal. The 1934 percentages were 33.5, 47, 14.5, and 5 respectively.

Shipments from the East to the Levant for the period 1st January to 17th March 1935 aggregated 14,681 tons, as compared with 10,566 tons in 1934, an increase of 38.9 per cent.

Shipments to Cuba, West Indies and America for the period 1st January to 21st March, 1935, totalled 54,096 tons, as compared with 18,031 tons in 1934.

WHALE OIL PRODUCTION.

The "*Bulletin des Matieres Grasses*" for March, 1935, p. 57, reproduces the following statistics relative to the production of whale oil over recent years :—

Year	No. Whales caught	Antarctic	Arctic	Africa	North Pacific	Japan	Total Oil in Barrels
1920	11,369	5,441	1,456	1,310	1,763	1,279	407,327
1921	12,174	8,448	310	1,263	129	1,487	471,141
1922	13,940	7,023	918	2,335	1,356	1,506	639,276
1923	18,120	9,910	1,204	3,105	1,363	1,422	817,314
1924	16,839	7,271	1,667	3,649	1,102	1,526	716,246
1925	23,253	10,488	1,523	4,384	1,892	1,875	1,040,408
1926	28,193	14,219	1,588	4,646	1,804	2,148	1,152,536
1927	24,175	12,665	1,403	4,144	2,064	1,546	1,191,922
1928	23,524	13,775	1,561	3,835	1,412	1,607	1,321,313
1929	27,896	20,341	1,159	3,362	1,241	1,463	1,886,082
1930	37,674	30,167	1,472	3,498	975	1,312	2,799,042
1931	42,874	40,201	703	823	—	1,147	3,686,976
1932	12,797	9,572	827	1,043	319	1,036	915,842
1933	28,668	24,327	1,257	1,168	591	1,325	2,596,778

(1 barrel = 170 kilos = 374 lbs.)

In a subsequent note by M. B. Bjelke, on the production of whale oil during the 1934—1935 season, it is mentioned that the season just ending will show a production from the South and Antarctic Seas of about 2,400,000 barrels, or practically 420,000 tons, not including some of the oil from Japanese and South American sources.

Producers have had no difficulty in disposing of this stock in advance, says the journal, as Germany has taken practically all of the unsold oil at a price of £15 c.i.f. German ports, naked in tanks. This quantity amounts to about 70,000 tons, and makes Germany the largest buyer of whale oil this season, contrary to preceding years when the position was held by Great Britain and Holland. The good results obtained for sales this season will probably mean a renewed fitting out by the whaling companies for next season, concludes the writer.

AGRICULTURAL SHOW, RAUB, PAHANG.

A small district agricultural show was held at Raub, Pahang, on 6th May, 1935. As the prize fund and space available were limited, exhibitors were confined to the Malays.

The schedule embraced the usual range of classes, pride of place being given to cereals, which consisted mainly of the prize winning exhibits from the mukim competitions in connexion with the All-Malayan Padi Competition. Satisfaction was expressed at the high quality not only of the cereal exhibits, but of the vegetables.

The Department demonstrated a full-sized rubber smoking cabinet, suitable for use on small holdings and also staged exhibits of high-yielding pure strains of padi which are known to be suitable to local conditions, and instructional exhibits in connexion with poultry keeping.

MALAYAN AGRICULTURAL EXPORTS, APRIL, 1935.

PRODUCT.	Net Export in Tons.				
	Year 1934.	Jan.-April 1934.	Jan.-April 1935.	April 1934.	April 1935.
Arecanuts ...	18,882	12,547	8,250	2,798	2,437
Coconuts, fresh † ...	100,826†	31,485†	31,924†	9,833†	9,099†
Coconut oil ...	25,485	8,331	9,799	2,080	2,528
Copra ...	95,618	33,329	39,080	5,830	8,714
Gambier, all kinds ...	2,170	693	931	134	259
Oil cakes ...	11,273	4,231	2,691	1,070	456
Palm kernels ...	3,196	862	1,071	365	246
Palm oil ...	15,852	3,912	7,092	1,668	2,669
Pineapples canned ...	66,633	20,660	20,489	6,371	5,615
Rubber ‡ ...	479,371‡	163,901‡	131,468‡	39,484‡	34,680‡
Sago,—flour ...	10,503	3,403	4,595	66*	869
" —pearl ...	6,177	1,307	1,486	541	376
" —raw ...	7,079*	1,763*	2,127*	683*	404*
Tapioca,—flake ...	5,761	2,972	582	800	78
" —flour ...	1,842*	671*	305*	139*	30
" —pearl ...	15,770	5,246	4,850	1,471	1,856
Tuba root ...	481	215½	177	65	43½

† hundreds in number.

* net imports.

‡ production.

Correction : *Malayan Agricultural Journal*, May 1935 p. 255 Malayan Agricultural Exports, March 1935.

Oil cakes. For 265 in last column read 460.

Palm kernels. For 460 in last column read 265.

MALAYAN PRODUCTION IN TONS OF PALM OIL AND KERNELS

(As declared by Estates)

Period.	Palm Oil		Palm Kernels	
	F.M.S.	U.M.S.	F.M.S.	U.M.S.
January 1935 ...	1,062.3	339.3	174.0	49.6
February „ ...	977.4	220.9	161.7	38.5
March „ ...	1,104.3	334.2	172.6	48.6
April „ ...	1,008.2	328.0	151.2	40.4
Total ...	4,152.2	1,222.4	659.5	177.1
Total-January to April 1934	3,734.5	824.3	637.0	159.6
Total for year 1934 ...	12,965	4,510	2,013	795

MALAYA RUBBER STATISTICS

ACREAGES OF TAPPALE RUBBER NOT TAPPED ON ESTATES OF 100 ACRES AND OVER, FOR THE MONTH ENDING 30TH APRIL, 1935.

STATE OR TERRITORY	Acreage of Tappable Rubber end 1933 (d)	ESTATES WHICH HAVE ENTIRELY CEASED TAPPING		ESTATES WHICH HAVE PARTLY CEASED TAPPING (a)		AREA OF TAPPALE RUBBER NEVER BEEN TAPPED			Total (3) + (5)	Percentage of (9) to (2) (10)	
		Acreage (3)	Percentage of (3) to (2) (4)	Acreage (5)	Percentage of (5) to (2) (6)	Acreage (7)	Percentage of (7) to (2) (8)				
(1)	(2)								(9)	(10)	
STRAITS SETTLEMENTS :—											
Province Wellesley	44,285	50	0.1	11,002	24.9	849	1.9	11,052	25.0		
Malacca	121,152	356	0.3	20,797	17.2	3,193	2.6	21,153	17.5		
Penang Island	1,366	194	14.2	236	17.3	148	10.8	430	31.5		
Singapore Island	28,842	3,700	12.8	6,760	23.5	689	2.4	10,460	36.3		
Total S.S.	195,645	4,300	2.2	38,795	19.8	4,879	2.5	43,095	22.0		
FEDERATED MALAY STATES :—											
Perak	260,595	3,706	1.4	48,225	18.5	14,183	5.4	51,931	19.9		
Selangor	310,003	6,385	2.1	51,854	16.7	13,755	4.4	58,239	18.8		
Negeri Sembilan	233,592	10,193	4.4	40,637	17.4	14,481	6.2	50,850	21.8		
Pahang	46,712	3,324	7.5	21,289	45.6	11,421	24.4	24,813	53.1		
Total F.M.S.	850,902	23,808	2.8	162,025	19.0	53,840	6.3	185,833	21.8		
UNFEDERATED MALAY STATES :—											
Johore	365,400	10,705	2.9	31,651	8.7	22,614	6.2	42,356	11.6		
Kedah (b)	126,588	3,880	3.1	22,423	17.7	19,349	15.3	26,303	20.8		
Kelantan	25,793	5,800	22.5	1,000	3.9	5,800	22.5	6,800	26.4		
Tringganu (b)	4,543	Nil	Nil	68	1.5	53	1.2	68	1.5		
Perlis (c)	1,181	Nil	Nil	608	51.5	Nil	Nil	608	51.5		
Brunei	(d) 4,991	Nil	Nil	1,423	28.5	879	17.6	1,423	28.5		
Total U.M.S.	528,496	20,385	3.9	57,173	10.8	48,695	9.2	77,558	14.7		
Total MALAYA	1,375,043	48,493	3.1	257,993	16.4	107,414	6.8	306,486	19.5		

Notes :—(a) Area out of tapping on Estates which have partly ceased tapping refers to areas definitely being rested and excludes areas on any tapping round.

(b) Registered Companies only.

(c) Rendered quarterly.

(d) Figures are as reported by estate managers.

TABLE I
MALAYA RUBBER STATISTICS
STOCKS, PRODUCTION, IMPORTS AND EXPORTS OF RUBBER, INCLUDING LATEX, CONCENTRATED LATEX,
FOR THE MONTH OF APRIL, 1935 IN DRY TONS.

[illegible]

^{††}Figures for the Dindings in columns 3 to 8 are included under F. M. S. with effect from 1st January, 1935.

TABLE II
DEALERS' STOCKS, IN DRY TONS 3

CLASS OF RUBBER		Federated Malay States	S'pore	Penang	Provincial Dutch Possessions	Johore	Kedah
22		23	94	25	25	27	28
DRY RUBBER		10,193	20,178	9,841	4,110	1,768	181
WET RUBBER		1,164	2,804	1,472	216	596	157
TOTAL		11,357	31,982	11,313	4,326	2,364	338

TABLE III
CONTINUED

PORTS	For month	January to April 1985
Singapore	35,811	140,933
Penang	10,875	44,860
Port Swettenham.	6,879	20,830
Malacca	295	1,254
MALAYA	53,860	207,877

TABLE IV

DOMESTIC EXPORTS		January to April 1985
AREA	32	33
Malay States	...	29,695
Straits Settlements	...	3,389
MALAYA	...	33,084
		120,565

Notes.—1. Stocks on estates of less than 100 acres and stocks in transit on rail, road or local steamer are not ascertained.

1. Stocks on estates of less than 100 acres and stocks in transit on rail, road or local steamer are not ascertained.

2. The production of less than 100 acres is estimated from the formula: Production + Imports + Stocks at beginning of month = Production + Stocks at end of month. + Consumption (13) + (14) + (17) + (18) + (19) + (20) + (21) + (22) + (23) + (24) + (25) + (26) + (27) + (28) + (29) + (30) + (31) + (32) + (33) + (34) + (35) + (36) + (37) + (38) + (39) + (40) + (41) + (42) + (43) + (44) + (45) + (46) + (47) + (48) + (49) + (50) + (51) + (52) + (53) + (54) + (55) + (56) + (57) + (58) + (59) + (60) + (61) + (62) + (63) + (64) + (65) + (66) + (67) + (68) + (69) + (70) + (71) + (72) + (73) + (74) + (75) + (76) + (77) + (78) + (79) + (80) + (81) + (82) + (83) + (84) + (85) + (86) + (87) + (88) + (89) + (90) + (91) + (92) + (93) + (94) + (95) + (96) + (97) + (98) + (99) + (100).

For the Straits Settlements the production of estates of less than 100 acres is represented by sales or exports as shown by gross pass.

3. Estimated Malay States are reduced to dry weights by the following fixed ratios: unsmoked sheet, 15% wet sheet, 25%.

Dealers' stocks in the Federated Malay States are reduced to dry weights by the following fixed ratios: unsmoked sheet, 15% wet sheet, 25% as shown by cess paid.

scrap, lump, etc., 40% ; stocks elsewhere are in dry weights as reported by the dealers themselves.

4. Column (33) and (34) represent exports of rubber subject to regulation which are being sent abroad for processing and re-exportation. The amount of such exports is shown by column (33). Column (34) shows the value of such exports as shown by cess paid.

J. S. M. S. at Singapore on 23

5. The above, with certain omissions, is the Report published by the Registrar-General of Statistics, S.S., and F.M.S., at Singapore on 21 May 1925.

METEOROLOGICAL SUMMARY, MALAYA, APRIL, 1935.

Locality.	AIR TEMPERATURE IN DEGREES FAHRENHEIT						EARTH TEMPERATURE		RAINFALL						BRIGHT SUNSHINE.					
	Means of			Absolute Extremes			At 1 foot	At 4 feet	Total.	Most in a day.	Number of days.				Total.	Daily Mean.				
	A.	B.	Min.	Max.	Mean of A and B.	Highest														
						Lowest.	Min.	Lowest.			Max.	Highest.	Thunderstorm.	Fog morning obs.			Gale force 8 or more			
Railway Hill, Kuala Lumpur, Selangor	91.5	72.1	81.8	95	70	85	74	84.9	85.6	13.00	330.2	2.17	22	20	12	9	1	161.00	5.37	44
Bukit Jeram, Selangor	89.4	72.9	81.1	91	70	87	75	85.0	87.2	5.83	148.1	1.34	15	14	2	1		202.35	6.75	55
Sitiawan, Perak	90.2	73.1	81.7	92	70	85	75	85.0	85.7	6.40	162.6	1.24	14	11	2	1		206.10	6.87	56
Temerloh, Pahang	90.0	72.9	81.5	94	70	82	75	86.0	86.3	2.54	64.5	1.04	12	8	7	4		168.20	5.61	46
Kuala Lipis, Pahang	89.9	71.9	80.9	93	69	80	75	84.1	84.5	7.80	195.1	1.86	16	13	4	22		181.80	6.06	50
Kuala Pahang, Pahang	86.9	74.7	80.8	90	72	81	77	84.6	85.1	14.20	360.7	3.55	17	15	1			206.55	6.88	56
Kallang Aerodrome, Spore	86.7	75.5	81.1	91	71	81	78	82.4	83.7	3.27	93.1	0.62	15	13	1		1	153.90	5.13	42
Butterworth, Province Wellesley	88.8	74.5	81.7	91	73	83	77	86.7	86.2	9.14	232.2	2.14	19	15	1			236.70	7.89	65
Bayan Lepas Aerodrome, Penang	88.8	74.4	81.6	91	72	85	77	86.3	87.5	8.92	225.6	2.61	15	12	7			221.85	7.39	61
Bukit China, Malacca	86.2	73.7	79.9	91	72	81	76	84.8	85.5	5.01	127.3	1.04	13	12	1		1	191.55	6.39	52
Kluang, Johore	89.2	71.3	80.3	93	69	81	73	82.8	82.9	8.83	224.3	2.50	16	15	10	17		165.20	5.51	45
Bukit Lahang, Mering, Johore	86.4	72.6	79.5	92	71	80	74	83.4	82.4	2.23	56.7	0.86	11	8	5	2		194.50	6.48	53
Alor Star, Kedah	90.4	73.4	81.9	95	71	78	76	86.7	86.1	10.21	259.3	1.62	17	16	13	1	2	226.20	7.54	62
Kota Bharu, Kelantan	90.2	72.4	81.3	92	70	85	75	84.2	84.2	3.19	81.0	0.59	10	9	3	3	1	238.20	7.94	65
Kuala Trengganu, Trengganu HILL STATIONS.	88.7	73.1	80.9	92	71	84	74	84.1	84.4	5.82	147.8	2.12	11	11	2	2	1	236.00	7.67	63
Fraser's Hill, Pahang 4268 ft.	75.1	63.4	69.3	78	62	69	65	73.1	73.0	4.95	125.7	1.00	19	16	4	12		148.40	4.95	41
Cameron Highlands, Tanah Rata, Pahang 4750 ft. ...	74.4	55.7	65.1	79	47	69	63	70.2	69.8	10.92	277.4	1.77	25	24	1		1	126.55	4.22	35
Cameron Highlands, Rhododendron Hill, Pahang 5120 ft.	72.8	59.9	66.3	77	56	66	62			11.46	291.1	1.74	25	22	1		1	135.45	4.51	37